

GEO. W. MELHUISH

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SYLLABUS
— OF —
INFANTRY TRAINING

AS SUGGESTED BY
IMPERIAL ARMY SERIES

AND ADOPTED BY
52nd OVERSEAS BATTALION
CANADIAN EXPEDITIONARY FORCE



COMPILED BY
Lieut-Col. A. W. HAY and
Lieut. H. J. HORAN,
52nd Battalion Canadian Expeditionary Force

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The CLARKE & STUART CO., Limited
COR. CORDOVA AND SEYMOUR STREETS
VANCOUVER, B. C.

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RANGES

Terms applied to arrangements.	Rifle.	Field Srt.	Heavy Batteries
	Yards.	Yards.	Yards.
Distant.....	2,800 to 2,000	6,500 to 5,000	10,000 to 6,500
Long.....	2,000 to 1,400	5,000 to 4,000	6,500 to 5,000
Effective.....	1,400 to 600	4,000 to 2,500	5,000 to 2,500
Close.....	600 and under	2,500 and under	2,500 and under

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SYLLABUS OF INFANTRY TRAINING

I. ATTACK. I. THE FIRST STAGE

1.—THE FIRST STAGE OF AN ATTACK. THE ADVANCE TO EFFECTIVE RANGES

(A) METHODS OF ADVANCING UNDER FIRE FROM ARTILLERY AND LONG RANGE INFANTRY

Training in method of advancing under fire, and in the use of ground.

I. T., Cap. 8.—Training in Field Opns.—Sec. 108

1. The soldier will be taught the importance of the relationship between fire and movement, and that the wise employment of every feature of the ground is of great importance in promoting fire effect and reducing losses. Special attention will be given to the various methods of advancing under different conditions of fire and ground, the conditions under which these methods are used being explained, while the one object of every advance, namely, **to close with the enemy**, is insisted on.

2. Platoon and section commanders will be taught that when an advance is being made by rushes, they should endeavour to decide beforehand on the next halting place, and should point it out to their men, who must get there as quickly as possible when the signal to advance is given.

3. Practical instruction will be given in the use of ground. The soldier will be taught that the most important requirement in cover when firing is that he can use his rifle to the best advantage. In endeavouring to do so he should expose himself as little as possible to the enemy's fire, but must understand that **if he merely seeks safety and neglects thereby the full use of his rifle he will be failing in his duty.**

4. If an equally good view can be obtained it is better to fire round the side of cover than over it, as the firer is then less visible.

5. When firing from behind cover the soldier must keep his eyes on the

target between each shot; otherwise he may lose sight of the target and this may result in his shooting without looking over the sights.

6. It will be explained that cover from view, which does not also afford cover from fire, should not provide a good aiming or ranging mark for the enemy.

7. A hedge or bush, in country where such features are of uncommon occurrence, may become a dangerous trap if men crowd behind it and the enemy discovers they are there.

8. Moving objects catch the eye more quickly than those that are still, and when in default of cover, men are lying in the open, all but the necessary movements to load and fire must be avoided.

9. Men halted in the open should not show up against the skyline.

10. Cover from hostile air-craft can best be obtained by moving through woods or along hedgerows.

11. It will also be explained that the difficulties of observation from the air are increased if men stand still or lie down when a hostile air-craft approaches, and refrain from looking up when it passes overhead.

12. It must be understood, however, that **when once committed to the attack no attempt will be made by the firing line and supports to seek cover from the enemy's air-craft**, the mission of which at this time will more probably be to locate the reserves.

13. It will be explained that even a few troops marching on a wide road are clearly visible from the air.

14. In order to conceal a movement from hostile air-craft troops should keep to the sides of the road, and march on grass rather than the metalled portion.

15. Narrow roads with high hedges are the most favourable for concealment.

Fire and formations in battle.

I. T. Cap. 9.—Infantry in Battle.—Sec. 118

1. The formations to be adopted in battle will depend principally on the ground and the tactical situation.

In order to avoid unnecessary loss in the attack, however, the comparative effect of artillery and rifle on the various formations at different ranges must be clearly understood by all leaders.

Similarly, if infantry in defence is to make the best use of its ammunition, it must know what targets are most vulnerable under the various conditions of the battlefield.

2. At effective ranges, troops advancing steadily and rapidly suffer less than when they remain lying down, even under moderately good cover. This is due to the moral effect on the enemy and to the constant alteration of the range.

In retiring losses are always heavier than in advancing.

3. Against frontal artillery fire, or direct long-range infantry fire, small

shallow columns, each on a narrow front, such as platoons or sections in fours or file, offer a difficult target while admitting of efficient control, and many be employed during the earlier stages of an attack.

These columns, making full use of the ground, should be on an irregular front, so that the range from the enemy's guns to each column is different, regard also being had to the forward effect of shrapnel.

Infantry coming suddenly under artillery fire will usually avoid loss more easily by advancing than by halting and making use of cover, the position and range of which will probably be known to the enemy.

4. Although serious effect from aimed infantry fire is not to be anticipated at ranges beyond about 1,400 yards, zones of considerable width, beaten by unaimed fire, may have to be crossed at such ranges. It is necessary that troops should be prepared for this and be ready to adopt formations which will reduce casualties.

This applies, not only to firing lines and supports, but to reserves and other bodies in rear.

Rifle fire at these long ranges has so steep an angle of descent that effective cover from it may be difficult to find.

5. On open ground swept by effective rifle fire an extended line is the least vulnerable formation, and on such ground it will usually be advisable to extend before it becomes necessary for the advancing troops to open fire.

A formation in small columns should, however, be retained as long as it is applicable to the situation, for when once extended, a unit loses its power of manœuvre.

As a general principle deployment is necessary when fire is to be opened, the amount of extension then depending on the volume of fire which it is required to produce, and upon the effect of the enemy's fire.

6. The greater the extension of a line, the fewer will be the casualties, but the less will be its fire effect.

When the infantry struggle for superiority of fire has begun, casualties will be reduced, not so much by the formations in which the troops are disposed, as by the material and moral effect of their fire and, still more, of the fire of the artillery, machine guns, and infantry who are covering the movement.

7. The fire effect which infantry can develop against cavalry is such that infantry which is ready to open a steady and timely fire has nothing to fear from a cavalry charge, provided the cavalry cannot find dead ground over which to approach.

Any formation which allows fire to be delivered quickly and accurately is suitable for meeting cavalry.

Closing an extended line to meet cavalry delays the opening of fire and may offer a vulnerable target to the enemy's artillery.

Even if cavalry succeeds in riding through a firing line it can inflict little loss upon it if the infantry holds its grounds.

Whenever there is a possibility of being charged by cavalry, special care must be taken to watch and guard the flanks.

8. Charges carried out by friendly cavalry will necessarily distract the enemy's attention from the firing line of the attack.

The attacking infantry must take advantage of such co-operation on the part of the cavalry by at once pressing forward and gaining as much ground as possible.

9. Artillery coming into action, limbering up, or in movement, is a vulnerable target against which rapid fire or even fire at long infantry ranges is justifiable.

Infantry will experience difficulty in putting shielded artillery out of action by direct fire even at close infantry ranges, but it can prevent the artillery from moving and interfere with the service of the guns.

Infantry can best obtain decisive effect against guns with shields by means of enfilade or oblique fire.

10. Machine gun sections with their guns on travelling carriages are as vulnerable as artillery limbered up; but detachments carrying the gun into action are difficult to distinguish from infantry.

Machine guns in position are a difficult target; to obtain good effect against them it is usually necessary to employ a considerable number of rifles.

11. Aircraft form a very difficult target to fire directed from the ground, and only a small proportion of their area is vulnerable. Bullets can pass through the fabric of aeroplane wings without doing serious damage.

Indiscriminate fire at hostile aircraft is, moreover, likely to cause casualties in neighbouring units, and will also disclose the position of the troops to the enemy's observer.

The strictest control must be exercised over all fire directed against aircraft.

In the case of rifle fire at aeroplanes, men should be instructed to aim six times the length of the machine in front, and in the case of airships at the nose of the envelope.

(B) USE OF GROUND

Training in methods of advancing under fire, and in the use of ground.

I. T. Cap. 8—Training in Field Opns.—Sec. 108

(See "A" of attack first stage, which includes this section.)

(C) RECONNAISSANCE IN ATTACK

Training in reconnaissance duties and instruction of scouts.

I. T. Cap. 8.—Training in Field Opns.—Section 110

1. All soldiers should be trained in reconnoitering, observing, and reporting the result of their observations.

2. One non-commissioned officer and four men in each company will in addition be specially trained as company scouts.

3. Infantry scouts work on foot, and usually operate near the force to which they belong. When more extended reconnaissance is required it will be carried out by mounted men or cyclists specially detailed for this purpose.

4. The value of the work done by scouts depends to a very great extent on the orders they receive before they are despatched on a particular duty.

Every party of scouts sent out must have a particular objective assigned to it, and must be given specific questions to answer.

The role of scouts is to observe and report, and when engaged on their special duties, they will only use their rifles in self defence.

5. The commander who despatches parties of scouts must arrange with them for means of rapidly communicating any intelligence gained.

6. During peace operations scouts should not be allowed to employ methods which would be impossible in war.

7. The training of scouts will be carried out principally during the period of individual training.

8. The methods to be adopted in the training of scouts are left to the officers concerned. The standard to be aimed at is that a scout should fulfil the following conditions:

(i) Know how to observe.

(ii) Be able to read a map easily.

(iii) Know what to report on, and how to make a report.

(iv) Be able to express himself clearly and concisely.

(v) Possess good sight and know how to use his eyes and ears.

- (vi) Be self-reliant, resourceful, and prepared to take risks.
 - (vii) Understand semaphore signalling, and, if possible, be acquainted with all methods of visual signalling.
 - (viii) Thoroughly understand the use of ground; be able to move about and see without being seen.
 - (ix) Be able to judge distance accurately and estimate numbers correctly.
 - (x) Be able to form sound conclusions from signs, such as clouds of dust, footprints, and so on.
 - (xi) Understand how to guide himself by compass, by the sun, and by stars.
 - (xii) Be of thoroughly sound physique and in good condition.
-

General considerations.

I. T. Cap. 10—Infantry in Attack.—Sec. 121. Sub-section 4

4. As much as possible of the line of advance must be reconnoitered beforehand.

In close country this will be carried out by officers or scouts; in open country it may be necessary to depend on observation through field glasses.

It will usually be found, as a result of such reconnaissance, that certain lines of advance afford better concealment than others. while the localities offering the best facilities for covering fire will be brought to notice.

The Company in the firing line.

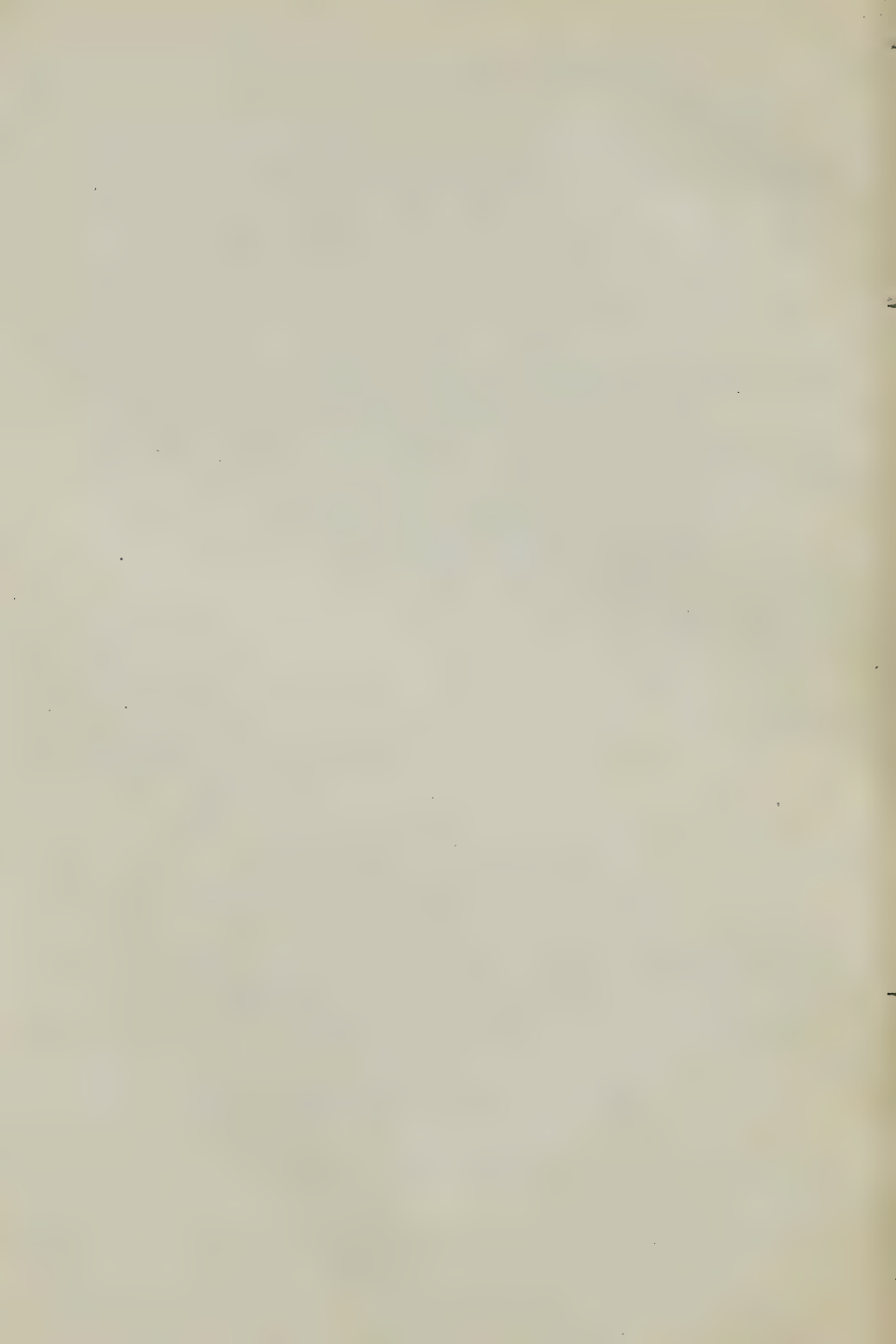
I. T. Cap. 10—Infantry in Attack.—Sec. 123. Sub-section 4

4. If considered desirable, a few scouts may precede the firing line before fire is opened, to feel the way for the advance. They should be sufficiently far in advance of the firing line and of the exposed flank of the company to obviate surprise and to obtain timely information as to the ground which the company is to cross.

In close or undulating country connecting files may be necessary to maintain touch with the scouts, but they should be recalled as soon as connection can be maintained without them.

Scouts preceding the firing line will, when checked, remain in observation until the firing line comes up to them, when they will rejoin their companies.

Scouts on the flanks will remain in observation and keep connection with other units on the flanks until recalled.



1. ATTACK. 2. THE SECOND STAGE

THE SECOND STAGE OF AN ATTACK. THE FIGHT FOR FIRE SUPERIORITY

(A) FIRE DIRECTION AND FIRE CONTROL

Fire direction and fire control

I. T. Cap. 9.—Infantry in Battle. Section 116

1. To obtain full value from the rifle, its powers and limitations must be understood, and its fire be applied with intelligence towards the object in view.

2. However skilful individual men may be, the greatest effect is produced by their fire only when it is efficiently directed and controlled.

Fire is said to be **directed** by the commander who defines the objective against which it is to be used, and to be **controlled** by the fire-unit commanders who give the necessary executive words of command.

In attack, occasions will frequently arise when fire-unit commanders must both direct and control the fire of their units, while at close ranges, or when men are widely extended, **it may happen that** the transmission of any fire order is impossible, and that **each individual man must control his own fire.**

3. The normal infantry fire-unit is the section, though under certain conditions at the longer ranges the fire of a platoon or even a whole company may be controlled by its commander. **The efficiency of section commanders is therefore of paramount importance.**

4. **The value of a fire-unit commander** depends upon his ability to apply the fire of his unit:

- (a) At the right time.
- (b) In the right volume.
- (c) To the right target.

55. In addition to his other duties the fire-unit commander is responsible for:—

- (i) Indicating targets.
- (ii) Issuing orders for sighting, and, when possible, supervising the correct adjustment of sights.
- (iii) Regulating the volume of fire; whether deliberate or rapid.
- (iv) Reporting when ammunition is running short.

6. When from his position it is possible for him to do so, the company commander decides as to the time for opening fire, subject to such orders as the battalion commander may issue, and regulates the supply of ammunition.

In the defence he also normally arranges for the distribution or concentration of fire, and indicates the targets generally to his subordinates; but in the attack these duties will usually devolve upon the subordinate commanders with the firing line.

7. In forming a decision as to when fire should be opened, the following considerations must have weight:—

- (i) The early opening of fire discounts surprise and, whether in attack or defence, often indicates the positions of troops which would otherwise be unnoticed by the enemy.

In attack it may unnecessarily delay the advance.

- (ii) Beyond 1,400 yards the fire of even large and well controlled units infantry has seldom much effect upon the decision of the struggle for superiority of fire.

Exceptional circumstances, such as the appearance of considerable bodies of the enemy in vulnerable formations, may, however, justify the use of long range fire, especially in the defence (see below).

- (iii) Between 1,400 and 600 yards, carefully controlled collective fire produces better results than the uncontrolled fire of individual man, which ceases to be sufficiently effective beyond ranges of about 600 yards to counterbalance the expenditure of ammunition involved.

8. Fire should therefore rarely be opened by infantry in attack when satisfactory progress can be made without it.

The leading troops in particular should save every possible round for the final struggle for superiority of fire at close range, as the replenishment of ammunition in the firing line at that time will be a matter of considerable difficulty.

When progress is no longer possible fire should be opened, either by such parts of the firing line as cannot advance, or by bodies of infantry specially detailed for this purpose, to enable a further advance to be made,

Subject to these principles fire may be opened in attack when there is a probability of its producing good effect, or when withholding fire might lead to heavy loss.

9. When infantry is acting on the defensive, there is usually less difficulty in arranging for the supply of ammunition.

Fire may therefore be opened at longer ranges than when attacking, if it seems probable that any advantage will be gained thereby, especially when it is desired to prevent the enemy coming to close quarters, and when the ranges have been ascertained beforehand.

If, however, the object is to gain decisive results, it is generally preferable to reserve fire for closer ranges and for surprise.

10. It is usually necessary to keep the enemy's firing line under fire throughout its length in order to disturb his aim and prevent his movement, but against very vulnerable targets, or to produce an increased effect at a particular place, fire may be concentrated with advantage.

11. Oblique or enfilade fire has greater moral and material effect than frontal fire, for it comes usually from an unexpected direction and the target presented to it is generally more vulnerable.

In defence, opportunities for the employment of enfilade fire may be created by careful pre-arrangement between the commanders of adjoining units.

12. In deciding on the volume of fire to be directed against the enemy at any particular time a commander should consider chiefly the tactical situation, the target presented, the effect it is desired to produce, the range, and the state of the ammunition supply.

Fire should, as a rule, be delivered deliberately, each man satisfying himself that every time he presses the trigger he will hit the object aimed at.

Rapid fire should be considered as a reserve of power to be used when the occasion demands it. It must combine accuracy with rapidity, and never degenerate into a wild expenditure of ammunition at the fastest possible rate.

Rapid fire may be required:

- (a) When it is necessary to beat down the enemy's fire quickly;
- (b) When covering the withdrawal of other troops;
- (c) When pursuing an enemy with fire;
- (d) When meeting cavalry attacks;
- (e) When good targets are exposed for a very short period;
- (f) Also, in attack, by all troops, as a final preparation for the assault, and in defence to beat off an enemy in the act of assaulting.

The effect of surprise by a sudden burst of accurate fire from an unexpected quarter is very great.

Short bursts of rapid fire, followed by pauses, favour observation of results and give time for the adjustment of sights. They also facilitate the control of fire in critical situations. The duration of such bursts must be strictly controlled, and limited to the requirements of the occasion, for if rapid fire is continued for any length of time it excites and exhausts the troops and leads to waste of ammunition.

13. A sudden effective fire is known to have a particularly demoralizing effect on the enemy; it is often advantageous therefore to seek for surprise effects of this sort by temporarily withholding fire.

14. Wild, unsteady fire causes little or no loss, and tends to encourage the enemy by inducing a belief in his mind that his opponent is shaken. It is therefore worse than useless against good troops.

15. Every available means should be used to obtain the correct ranges.

Observers will be employed, as necessary, to assist in observation of fire, in watching the enemy and neighboring troops, and in keeping up communication between platoons.

16. Observation of fire is the best means of ensuring that fire is effective. If uncertainty as to the elevation exists it is better to underestimate than to overestimate the range. If it is necessary to fire at ranges beyond 1,000 yards and observation has failed, or the situation requires that some effect should be produced quickly, combined sights may be employed, but satisfactory results will seldom be obtained by bodies of less than two platoons.

(B) WHEN TO OPEN FIRE

Fire direction and fire control.

I. T. Cap. 9—Infantry in Battle.—Section 116

(See "A" of second stage.)

(C) FIRE DISCIPLINE

Fire discipline.

I. T. Cap. 9.—Infantry in Battle. Sec. 117

1. A high standard of fire discipline in the men is not less important than skilful direction and control of fire by the commanders.

Fire discipline means strict attention to the signals and orders of the commander, combined with intelligent observation of the enemy.

It ensures the careful adjustment of the sight deliberate aim, economy of ammunition and prompt cessation of fire when ordered or when the target disappears.

It requires of the men endurance of the enemy's fire, even when no reply is possible.

And a cool and intelligent use of the rifle when superior control can no longer be exercised.

(D) CHOICE OF FIRE POSITIONS INCLUDING PRACTICAL INSTRUCTION IN THE DIFFERENCE BETWEEN A GOOD POSITION AND A BAD ONE

Training in Methods of advancing under fire and in the use of ground.

I. T. Cap. 8—Training in Field Operations.—Sec. 108

See 1 Attack.—1 First stage.—("A").

(E) COVERING FIRE IN ATTACK

General considerations Sub-section 8.

I. T. Cap. 10—Infantry in Attack.—Section 121

8. When the ground permits, it is generally necessary to detail special detachments of infantry to provide covering fire for the leading troops.

These detachments will usually be detailed from local reserves in the original distribution for the attack, but any commander, at any stage of the fight, may detail troops from those under his command to assist his advance.

No fire-unit commander, however, is justified in abandoning, on his own initiative, an advancing rôle in order to become a detachment for covering fire.

In undulating or mountainous country it may be possible for these detachments to cover the advance from positions in rear, but in flat country it is impossible for infantry or machine guns to fire over the heads of their own troops, and opportunities for supplying covering fire must be sought on the flanks.

(See Sec. 116, 11.)

Troops detailed to give covering fire to others must take care to select as targets those bodies of the enemy whose fire is chiefly checking the advance. Great difficulty will often be experienced in detecting which these are, and all ranks must be on the alert to notice any indication of their presence.

As soon as their fire ceases to be effective in aiding the advance of the firing line, it is the duty of troops detailed to give covering fire at once to join in the advance, unless definitive orders to the contrary have been received.

(F) REINFORCING

Reinforcing (when two extended lines are being drilled in co-operation.)

I. T. Cap. 5—Extended Order Drill—Section 93.—Sub-section 11

The rear or supporting line will double forward into the intervals of the first or firing line, unless the reinforcement is directed on to a flank, which should be done when possible.

Note.—When a platoon or company is being exercised in extended order, subordinate commanders will be practised in the reorganization of units after reinforcement has taken place into the intervals of an extended line. Leaders will at once take command of the men in their vicinity, and the men will assist by placing themselves under the nearest officer or N. C. O.

After units have been reorganized in this manner they must, as far as possible, be re-formed under their original leaders on the first opportunity.

The company in the Firing line.

I. T. Cap. 10—Infantry in Attack.—Section 123.—Sub-section 7.

The distances between the firing line and supports will be determined by the company commanders, or the officers commanding each portion of the supports, according to the ground; they will seldom be the same in every company, and may vary during the course of an advance.

If the ground is favourable supports should close up to the firing line under cover; on open ground the distance between them should be such that the supports will not suffer heavy losses from fire directed at the leading line (**See Sec. 118**).

The aim of officers commanding supports must be so to handle their commands as to be able to reinforce the firing line with as little delay as possible when required.

Care must be taken not to dissipate energy by reinforcing in driblets.

Reinforcement should usually be by bodies not smaller than platoons.

In the latter stages of an attack it is essential that reinforcing lines should carry up extra ammunition for the men in front.

(G) REORGANIZING UNITS

Control and communication by signal.

I. T. Cap. 5—Extended Order Drill.—Section 94

1. As soon as men have learnt how to drill when controlled by word of command, they will be taught how control can be exercised and communication

maintained by means of the signals given below. As a preliminary measure, recruits should be formed up as for squad drill with intervals, and made to perform the various signals in unison, the instructor first giving the corresponding word of command or message and demonstrating the manner in which the signal should be made.

2. When controlling men by signal a "short blast" of the whistle (*i.e.* "the cautionary blast," see Sec. 95, I) will first be blown, on which each man will look towards the instructor, who will then make the signal. When he is satisfied that it is understood, the instructor will drop his hand to the side, on which the men will act as ordered. Signals should be made with whichever arm will show most clearly what is meant.

3. The following "control signals" are used:—

Extend.—The arm extended to full extent over the head and waved slowly from side to side, the hand to be open and to come down as low as the hips on both sides of the body.

Notes.—i. The above signal denotes **extend** (from the centre). If it is required to extend to a flank, the leader will point to the required flank before dropping his hand.

ii. The number of paces to which men are to extend will, unless pre-arranged, be communicated to the nearest men by word of mouth and passed on by them.

Advance.—The arm swung from rear to front below the shoulder.

Halt.—The arm raised at full extent above the head.

Retire.—The arm circled above the head.

Change direction, right (or left).—The arm is first extended in line with the shoulder. A circular movement is then made, on completion of which the arm and body should point in the required direction.

Notes.—i. When troops are halted, the above signal means **change position, right (or left).**

ii. When troops are in column of fours, or in file or single file, the above signal means **right (or left)—wheel.**

Right (or Left) Incline.—The body or horse turned in the required direction and arm extended in line with the shoulder, and pointing in the direction required.

Note.—There is no separate signal for the command **right (or left) turn**, but the "Incline signal" given twice in succession will effect the movement.

Close.—The hand placed on top of the head, elbow to be square to the right or left according to which hand is used.

Notes.—i. The above signal denotes **Close** (on the centre). If it is required to close on a flank, the leader will point to the required flank before dropping his hand.

ii. If, when on the march, it is required to halt as well as close, the leader will perform the halt signal before dropping his hand.

Quick Time.—The hand raised in line with the shoulder, the elbow bent and close to the side.

Double.—The clenched hand moved up and down between the thighs and shoulder.

Reinforce.—The arm swung from rear to front above the shoulder.

Lie Down.—Two or three slight movements of the open hand towards the ground.

4. The following “communicating signals” are made with the rifle or other weapon.

Enemy in Sight in Small Numbers.—Weapon held up above, as if guarding the head.

Enemy in Sight in Large Numbers.—As for “Enemy in sight in small numbers,” but the weapon raised and lowered frequently.

No Enemy in Sight.—Weapon held up at full extent of arm, point or muzzle uppermost.

The assault and pursuit

I. T. Cap. 10—Infantry in Attack.—Section 124.—Sub-section 13.

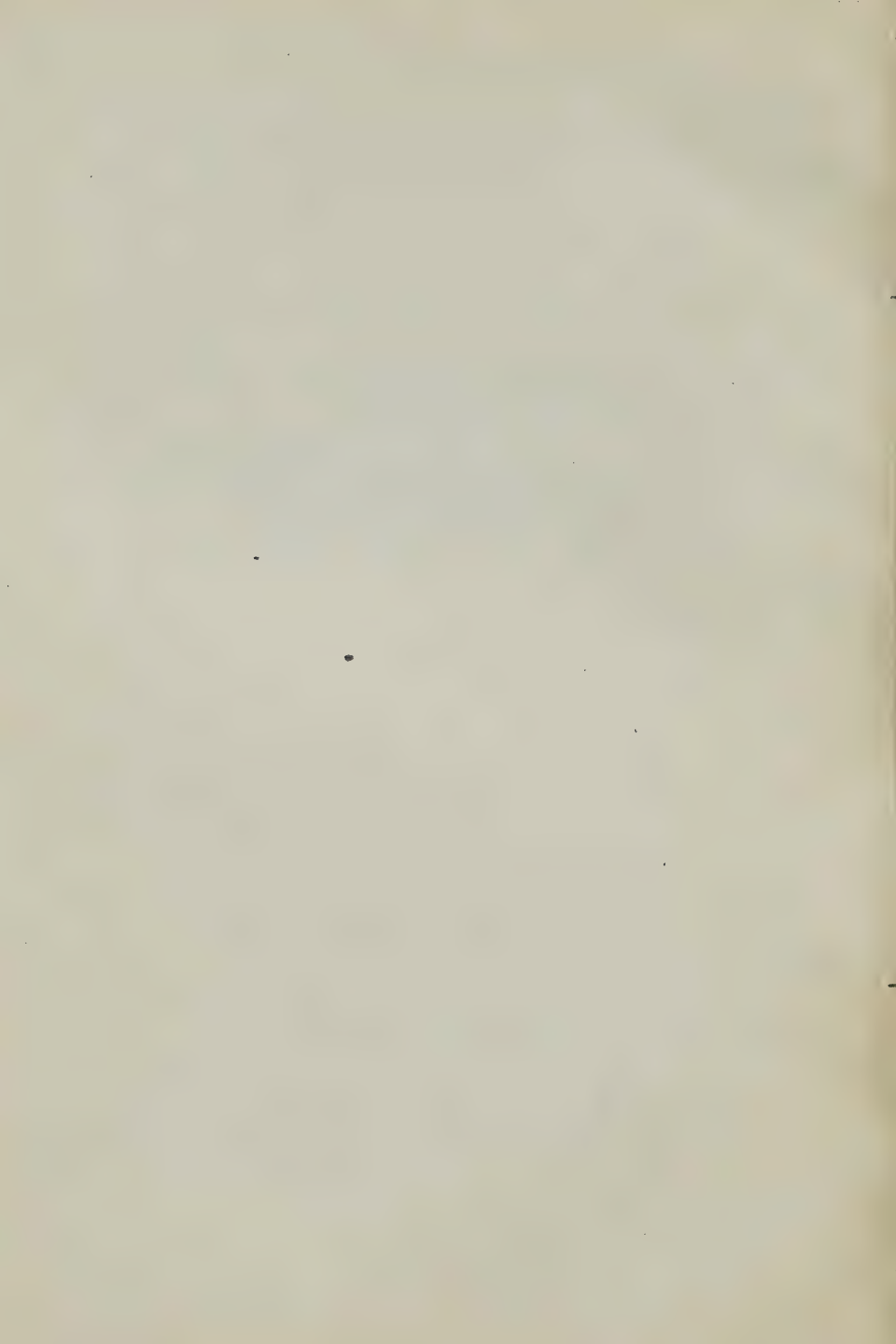
If, when reinforcing the firing line, or at any other time, a soldier loses touch with his section commander, it is his duty to place himself under the orders of the nearest officer or non-commissioned officer, irrespective of the company or battalion to which he may belong.

(H) AMMUNITION SUPPLY IN ATTACK

General considerations.

I. T. Cap. 10—Infantry in Attack.—Section 121.—Sub-section 11.

During the latter stages of an attack the replenishment of ammunition in the firing line by individuals will be practically impossible, and all reinforcing troops must be provided with extra rounds for the men in front.



The direct issue from and replenishment of the battalion S.A.A. carts and pack animals.

I. T. Cap. 16—Ammunition Supply.—Section 166

1. The small arm ammunition available in an infantry battalion consists of:—

120 rounds carried by the soldier.

100 rounds, regimental reserve, carried for each rifle partly on eight pack animals (two per company) and the remainder either in S. A.A. carts or on pack animals. (In expeditionary Force and Territorial Force War Establishments each battalion has five S.A.A. carts in addition to the company pack animals and the ammunition cart of the machine gun section.

The whole of the ammunition allotted to infantry battalions in "War Establishments," India, is carried on pack transport.

In India the number of rounds differ, chiefly owing to the requirements of pack transport, but the principles are the same, the brigade reserve being formed by detaching a portion of the regimental reserve. The section reserve always remains with companies.)

3,500 rounds are carried in the limbered wagons of the machine gun section. 8,000 rounds reserve ammunition are carried in the S.A.A. cart of the section.

2. A brigade reserve, under a selected officer, will normally be formed by detaching from each battalion as much of its regimental reserve ammunition as the brigade commander may think fit.

The brigade reserve forms a link between the regimental reserve and the artillery brigade ammunition column. It should be regarded as available for the brigade generally, but in the case of necessity it will supply ammunition to any troops engaged.

This reserve marches in rear of the brigade and during an action moves as the brigade commander may direct. It should be accompanied by orderlies to maintain communication with the various regimental reserves.

If battalions are detached to any distance, they will usually take the whole of their regimental reserves, with them, the brigade reserve being re-formed on their return.

3. The commander of the brigade ammunition reserve will:—

i. Open up communication with the artillery brigade ammunition column and also with the various regimental reserves.

ii. Take the earliest opportunity to fill up empty transport from the artillery brigade ammunition column.

The request for the amount of ammunition required will be sent, in writing, to the officer in charge of the small arm ammunition section of the artillery brigade ammunition column by the artillery orderly furnished for that purpose, who, will also act as guide to the officer

bringing the ammunition forward. This orderly will be used for no other purpose.

When the ammunition is carried in S. A. A. carts the number of full carts required will be demanded, in other cases the required number boxes.

- iii. Not send men and transport animals belonging to the brigade reserve to the artillery brigade, ammunition column, nor men and transport animals belonging to the latter further to the front than the brigade reserve, except in case of emergency.
- iv. Retain empty transport in the brigade reserve until reloaded or replaced.
- v. Sign receipts prepared by the officer in charge of the artillery brigade ammunition column for the number of full carts received, if the ammunition is forwarded in S.A.A. carts, or for the number of full ammunition boxes if the ammunition is forwarded by other transport.
- vi. After an action or during a pause in the engagement make good from the artillery brigade ammunition column all deficiencies of ammunition.
4. The ammunition transport remaining with each battalion after the brigade reserve has been formed marches in rear of the battalion, or as the brigade commander may direct.

5. Whenever a collision with the enemy is probable battalion commanders, will, on their own initiative, increase the number of rounds carried by each man to 200 from their regimental reserves, taking the necessary steps to replenish their reserves as soon as possible from the brigade reserve.

It will usually be advisable to issue these extra rounds from the portion of the regimental reserve not allotted to companies.

6. On deployment the transport carrying the machine gun ammunition moves as directed by the commander of the machine gun section.

The portion of the regimental reserve not allotted to companies will be under the sergeant-major; it will, at the outset, be retained in the hands of the battalion, commander, and will move as directed by him. The exact distributions in action of the regimental reserve must principally depend on the nature of the ground.

The object is to maintain the power of replenishing the supply from the brigade reserve, whilst getting the regimental reserve as far forward as possible so as to facilitate the supply of ammunition to the firing line.

The sergeant-major should be provided with signallers and orderlies when necessary, for the purpose of maintaining communication with the company pack animals and with the brigade reserve.

As the regimental reserve becomes empty it will be refilled or exchanged, under the direction of the sergeant-major, from the brigade reserve.

During the final stages of the attack every opportunity of gaining ground must be seized, so that the regimental reserve may be at hand as soon as the position is carried.

7. The ammunition pack animals allotted to companies join their respective



companies on the deployment of the battalion, or when the companies are detached, and are then placed under the charge of company quarter-master-sergeants.

During an action the company quarter-master-serjeant will direct the movements of the pack animals in accordance with the orders of the company commander and will keep as close to the company as possible.

When men have once joined the firing line they cannot be withdrawn to replenish ammunition except under very favourable conditions of ground, and the ammunition of the firing line must therefore be replenished by reinforcing lines.

Commanders of reinforcing troops will therefore carefully watch the progress of the pack animals, and previous to losing touch with these reserves will draw extra bandoliers of ammunition for their own unit and for the firing line in front.

It will be the duty of the company quartermaster-serjeants concerned to superintend the issue of this ammunition, and, as soon as the supply is exhausted, to return to the regimental reserves for a further supply.

When their own companies are absorbed in the firing line they will place their pack animals in the most favourable position for the issue of ammunition to the successive reinforcing troops. If more convenient, commanders of reinforcing troops may draw extra ammunition direct from the regimental reserves instead of from the company pack animals.

8. The amount of extra ammunition so issued to reinforcing troops must be dependent on:—

- i. The expenditure at the front.
- ii. The cover afforded by the ground to these reinforcements in their advance to the firing line.
- iii. The amount of ammunition which a man can carry without impairing his efficiency.

Open ground, in the face of a heavy fire, must be crossed by short rushes at top speed. For such an advance activity is the first consideration, and men should not be called upon to carry more than 300 rounds, except when the ground can be crossed in a single rush.

(J) ADVANCING BY RUSHES

General considerations

I. T. Cap. 10—Infantry in Attack.—Sec. 121. Sub-section 12

When the advancing line is checked by a heavy and accurate fire, it will become necessary to continue the advance by rushes, which, according to the ground and the proximity of the enemy, will be made by the whole line simultaneously or by portions of it alternately.

The length of rushes must depend upon the ground, the enemy's fire, and the physical condition of the troops.

It is often advisable to make a rush of some length across open ground in order to reach good cover behind which men can rest.

Similarly, if a firing line finds a long downward slope devoid of cover, it is often best to make one rush to the bottom of the slope.

In advancing by rushes within close infantry range the particular portions of the line to move first, and the strength of each such portion, will be determined partly by the ground and the enemy's fire, but chiefly by the **resolution and determination of the various leaders in the front line.**

It must therefore be the principal aim of every leader in the front line to get his command forward.

Rushes should be as strong as is reasonably possible. Creeping and advancing man by man check the rate of progress and are to be regarded as exceptional methods, only to be employed when it is impossible to gain ground in any other way.

The Company in the Firing Line.

I. T. Cap. 10.—Infantry in Attack.—Section 123. Sub-section 9

As soon as he has received his orders the platoon commander:

- (a) Should explain the situation to his subordinates and point out the line of advance.
- (b) He must ensure that the movements of his platoon do not mask the fire of units on his flanks.
- (c) And must endeavour to co-operate with neighbouring units throughout the attack.
- (d) He must direct the fire of his platoon as long as it is possible for him to do so.
- (e) Regulate the expenditure of ammunition.
- (f) And take steps to secure a further supply when required.
- (g) He must watch the enemy's movements.
- (h) And report at once to the company commander and to neighbouring units if anything of importance is observed.
- (i) He must also be on the look-out for signals from his company commander and should detail an observer to assist him in his duty.
- (j) During the advance he must take every opportunity of rallying his command on suitable ground.
- (k) When the whole platoon is advancing by rushes he must select and point out successive halting places, and must himself lead the rush.
- (l) After a successful assault he must get the men in his vicinity under control as quickly as possible in preparation for an immediate pursuit

(K) CO-OPERATION OF CAVALRY AND ARTILLERY

Fire and formation in Battle.

I. T. Cap. 9—Infantry in Battle.—Section 118

(See First Stage "A").

General considerations.

I. T. Cap. 10—Infantry in Attack.—Section 121

1. As is explained in the Field Service Regulations, a commander who decides to take the initiative in forcing a decision usually divides his force into two parts; the first part develops the attack, wears down the enemy's power of resistance by engaging him along his front and endeavouring to force him to use up his reserves, and thus prepares the way for the decisive blow to be struck by the second part, known as the General Reserve.

The commander regulates the action of the two parts of his force chiefly by fixing their relative strength and preliminary position, by allotting their respective tasks, and by arranging for the correct timing of their movements in accordance with his general plan of battle.

2. When the commander of an attacking force has issued his orders it lies with the subordinate commanders to distribute the troops at their disposal in accordance with the tasks allotted to them.

Part of the infantry available will form **the firing line**, a portion of which will usually be kept back to form **supports**. Behind these will follow **local reserves** in the hands of battalion, brigade, and divisional commanders.

3. The relative strengths of these bodies will depend on the ground, the information available, time conditions, and the possibility of effecting a surprise. Each portion of the firing line will be given a definitive objective or task, and it may also be advisable to fix the limits of its flanks.

4. As much as possible of the line of advance must be reconnoitred beforehand. In close country this will be carried out by officers or scouts; in open country it may be necessary to depend on observation through field glasses.

It will usually be found, as a result of such reconnaissance, that certain lines of advance afford better concealment than others, while the localities offering the best facilities for covering fire will be brought to notice.

5. The main essential to success in battle is to **close with the enemy, cost what it may**.

A determined and steady advance lowers the fighting spirit of the enemy and lessens the accuracy of his fire.

Hesitation and delay in the attack have the opposite effect. **The object of infantry in attack is therefore to get to close quarters as quickly as possible**, and the leading lines must not delay the advance by halting to fire until compelled by the enemy to do so..

6. **The object of fire in the attack, whether of artillery, machine guns, or infantry, is to bring such a superiority of fire to bear on the enemy as to make the advance to close quarters possible.**

7. The action of infantry in attack must therefore be considered as a constant pressing forward to close with the enemy.

Owing to the effect of the enemy's fire, however, this onward movement can rarely be continuous, and when effective ranges are reached there must usually be a fire-fight, more or less prolonged according to circumstances, in order to beat down the fire of the defenders.

During this fire-fight the leading lines will be reinforced; and as the enemy's fire is gradually subdued, further progress will be made by bounds from place to place, the movement gathering renewed force at each pause until the enemy can be assaulted with the bayonet.

8. When the ground permits, it is generally necessary to detail special detachments of infantry to provide covering fire for the leading troops.

These detachments will usually be detailed from local reserves in the original distribution for the attack, but any commander, at any stage of the fight, may detail troops from those under his command to assist his advance.

No fire-unit commander, however, is justified in abandoning, on his own initiative, an advancing rôle in order to decoy a detachment for covering fire.

In undulating or mountainous country it may be possible for these detachments to cover the advance from positions in rear, but in flat country it is impossible for infantry or machine guns to fire over the heads of their own troops, and opportunities for supplying covering fire must be sought on the flanks. (See Sec. 116, 11.)

Troops detailed to give covering fire to others must take care to select as targets those bodies of the enemy whose fire is chiefly checking the advance. Great difficulty will often be experienced in detecting which these are, and all ranks must be on the alert to notice any indication of their presence.

As soon as their fire ceases to be effective in aiding the advance of the firing line, it is the duty of troops detailed to give covering fire at once to join in the advance, unless definitive orders to the contrary have been received.

9. During the advance, all important tactical points gained, such as suitable buildings, small woods, &c., should, when required, at once be put in a state of defence, so that the enemy may not be able to recapture them and that they may serve as supporting points to the attack.

Local reserves will often find opportunities for strengthening localities gained by the firing line, and to assist them in this work, detachments of engineer field companies may be attached to them with advantage.

10. Infantry when advancing must be careful not to interfere with the fire of guns in action. A line of guns should be passed on the flanks, or in the intervals between batteries and brigades. If it is unavoidable that infantry should pass through guns, it should do so at the double. Infantry ceases to mask the fire of artillery about 500 yards in front of the guns on level ground.

11. During the later stages of an attack the replenishment of ammunition in the firing line by individuals will be practically impossible, and all reinforcing troops must be provided with extra rounds for the men in front.

12. When the advancing line is checked by a heavy and accurate fire, it will become necessary to continue the advance by rushes, which, according to the ground and the proximity of the enemy, will be made by the whole line simultaneously or by portions of it alternately.

The length of rushes must depend upon the ground, the enemy's fire, and the physical condition of the troops.

It is often advisable to make a rush of some length across open ground in order to reach good cover behind which men can rest.

Similarly, if a firing line finds a long downward slope devoid of cover, it is often best to make one rush to the bottom of the slope.

In advancing by rushes within close infantry range the particular portions of the line to move first, and the strength of each such portion, will be determined partly by the ground and the enemy's fire, but chiefly by the **resolution and determination of the various leaders in the front line.**

It must therefore be the principal aim of every leader in the front line to get his command forward.

Rushes should be as strong as is reasonably possible.

Creeping and advancing man by man check the rate of progress and are to be regarded as exceptional methods, only to be employed when it is impossible to gain ground in any other way.

13. Infantry in attack must not delay the advance or diminish the volume of fire by entrenching.

Entrenchments in the attack are only used when, owing to further advance being impossible, the efforts of the attacking force must temporarily be limited to holding the ground already won. The advance must be resumed at the first possible moment.

14. Whenever a subordinate artillery commander is allotted a task necessitating co-operation with a certain force of infantry, whether he is placed under the orders of that force or not, it becomes his duty to open communication with its commander, reporting to him in person if possible, in order to obtain full information as to the character of the operation that he is to support, and as to the proposed method of its execution.

The best results will be obtained when the artillery commander is able to discuss the situation with the infantry commander before the operation begins, but if this is not possible, or if he cannot remain with the infantry commander, he should be represented by an artillery officer.

It is the duty of the infantry commander concerned, once communication with the artillery has been opened, to assist in its maintenance throughout the oper-

ation. It is unsafe to rely on one means of communication only, and two, or even more, should usually be arranged.

15. For the purpose of directing the fire of his batteries against what are, for the time being, the most important targets from the infantry point of view, the information which is of primary importance to the artillery commander is the exact positions of the infantry which he is supporting, its immediate objective, and the cause which is preventing it from reaching this objective.

16. Quick-firing guns cannot maintain a rapid fire throughout a battle. Artillery use rapid fire when the infantry firing line is seen to be in need of assistance to enable it to advance; infantry must take every advantage of periods of rapid artillery fire to gain ground.

17. In communications between infantry and artillery the mutual adoption of some system of describing the features of the ground, such as squared maps or panorama sketches, will often save delay and misunderstanding.

18. If the enemy is surprised it is of the utmost importance to increase the demoralization which the surprise will have already produced by pressing forward with the greatest energy.

In such conditions the gradual building up, by means of successive reinforcements, of a powerful firing line, should be discarded, and the firing line should be strong from the first.

A portion of the attacking force should, however, be retained temporarily in reserve to meet counter-attacks and unforeseen emergencies.

(L) INTERCOMMUNICATION AND PASSING OF ORDERS

Control and communication by verbal messages.

I. T. Cap. 5.—Extended order Drill.—Section 96.

1. In the later stages of an action it will frequently occur that movements in extended order can no longer be controlled by whistle and signal without attracting the attention of the enemy.

In these and similar circumstances it will often be necessary for orders and messages to be transmitted from section commander to section commander, or even from man to man, by word of mouth.

2. The correct transmission of orders and messages by this method during the distracting influences of a battle is particularly difficult, and in order to attain proficiency it is important that all ranks should be given frequent practice especially during extended order drill, during field practices, and whenever blank ammunition is being used.

3. Orders and messages to be transmitted by this method must be as concise as is compatible with clearness.

They must be passed as quietly as circumstances permit, and each word must be pronounced distinctly and deliberately.

They must begin with the designation of the person for whom they are intended, and must end with the designation of the sender and the time of despatch; for instance, "To Commander No. 2 Section. Open fire on enemy near bushes 700 yards to your front. From Commander No. 1 Platoon, 3 p.m."

It is forbidden to send a verbal order without saying from whom it emanates and for whom it is intended, e.g., "Halt in front."

4. The recipient of a verbal order will acknowledge it by a salute if the sender is within view; if not, it must be acknowledged by a return message.

5. When the platoon or company is being exercised in extended order drill, individual men will be practised in carrying verbal messages direct from the issuer to the person addressed.

The bearer of a verbal order or message should repeat it to the issuer and understand its purport. On approaching the addressee he should call out "Message for" and the name of the addressee in a loud tone. It is the duty of the senior present to direct the messenger. After receiving the message the addressee should repeat it to the bearer.

Intercommunication and passing of orders.

I. T. Cap. 9.—Infantry in Battle.—Section 119.

1. All subordinate commanders are responsible for keeping their respective superiors, as well as neighbouring commanders, regularly informed of the progress of events and of important changes in the situation as they occur.

All ranks should notice what takes place within their view and hearing, and report anything of importance accurately and at once to their immediate superior, who must pass the information on to the higher commanders and to neighbouring units.

This is the foundation of co-operation in war and is essential not only in battle but at every stage of a campaign.

2. The senior in any body of troops is responsible for forwarding messages to their destination.

3. During an action every company commander will leave with the battalion commander one man of his company who can be trusted to carry a verbal message or order correctly and to describe intelligently the local situation. These men will be used to convey urgent orders to the companies in action, when this is possible.

Similarly battalion commanders will send a representative of his battalion to brigade headquarters during an action.

4. Within the battalion, orders and messages in battle will normally be verbal. Verbal initial instructions by a commander on the battlefield should conform generally to the accepted type of written orders. They should give first such information of the enemy and his own troops as may be necessary, then his task and the general manner in which he intends to carry it out, and after that, detailed orders for the units at his disposal.

The importance of giving orders in a firm tone of voice and in a calm, determined manner cannot be exaggerated.

The passing of verbal orders and messages is to be reduced to a minimum owing to the liability of errors in transmission.

In the firing line all verbal messages necessary must be passed as quietly as possible, as a rule from section commander to section commander.

The fewer the individuals by whom the message has to be repeated, the less chance will there be of errors creeping in. (**See Sec. 96.**)

5. Throughout an action all commanders should try to anticipate the various situations which may occur, and should decide what steps they should take to meet them. They will thus be better able, when the necessity arises, to issue orders promptly and with decision.

6. On a battlefield, when the ground is open, inter-communication between bodies of troops taking part in an attack becomes very difficult as soon as the enemy's fire is severely felt. Messengers may be unable to approach, and signalling may be impossible. In these circumstances co-operation is only secured by the watchfulness of the officers, especially those superintending the fight in any portion of the field.

If officers are alert to act on indications expressed by the movement, or absence of movement, of their own troops or of the enemy, and if their tactical training has been conducted on sound and uniform principles, suitable action will follow in spite of the breakdown of positive methods of inter-communication.

I. ATTACK.—3. THE THIRD STAGE

THE THIRD STAGE OF AN ATTACK. THE ASSAULT AND PURSUIT

(A) THE ASSAULT AND PURSUIT

The assault and pursuit.

I. T. Cap. 10.—Infantry in attack.—Section 124.

1. The fact that superiority of fire has been obtained will usually be first observed from the firing line; it will be known by the weaning of the enemy's fire and perhaps by the movements of individuals or groups of men from the enemy's position towards the rear.

The impulse for the assault must therefore often come from the firing line, and it is the duty of any commander in the firing line, who sees that the moment for the assault has arrived, to carry it out, and for all other commanders to co-operate.

2. On rarer occasions the commander of the attacking force may be in a position to decide that the time has come to force a decision, and may throw in reinforcements from the rear so that the firing line may gain the necessary impulse for the assault. This will be more likely to occur when the enemy is strong and determined, and the fire fight at close infantry range has been prolonged and severe.

In order to ensure an effective and concerted blow it is important that these reinforcements should be brought up well under control, that they should be in sufficient strength to create the necessary impulse, and that all ranks should understand exactly what is required of them.

3. Subordinate commanders in the firing line will decide when bayonets are to be fixed, in accordance with the local conditions of the combat and the nature of the ground.

The commander who decides to assault will order the **charge** to be sounded, the call will at once be taken up by all buglers, and all neighbouring units will join in the charge as quickly as possible.

During the delivery of the assault the men will cheer, bugles be sounded, and pipes played.

The bursts of artillery fire will have become frequent and intense at this period, the object of the artillery being to demoralize the defenders and reduce their volume of fire.

Whether the artillery can continue firing until the assaulting infantry is actually on the point of closing with enemy, or whether it should increase the range on the first sign of the assault must depend on the slope of the ground.

4. If the assault is successful, and the enemy driven from his position, immediate steps must be taken to get the attacking infantry in hand for the further work that lies before them.

The victory is as yet but half won; decisive success will be achieved only by the annihilation of the enemy.

A portion of the troops must at once be pushed forward to harry the retreating forces while the remainder are being re-formed, under their own officers if possible, in preparation for a relentless pursuit.

5. Owing to the possibility of hostile gun-fire being brought to bear on the captured position, units should not be re-formed on the position itself, but should move forward to the least exposed localities available.

The task of re-forming units will usually fall to subordinate leaders.

6. Steps must be taken to meet a possible counter-attack.

7. As soon as re-formed, units must be ready to carry on the pursuit by day and night without regard to their exhaustion.

To sustain a relentless pursuit the utmost energies of every command must be exerted; only indomitable will can overcome fatigue and carry the men forward. A commander must demand the impossible and not think of sparing his men.

Those who fall out must be left behind and must no more stop the pursuit than casualties stopped the assault.

8. Infantry in pursuit should act with the greatest boldness and be prepared to accept risks. Delay for the purpose of detailed reconnaissance or for turning movements is not warranted, and the enemy must be attacked directly he is seen.

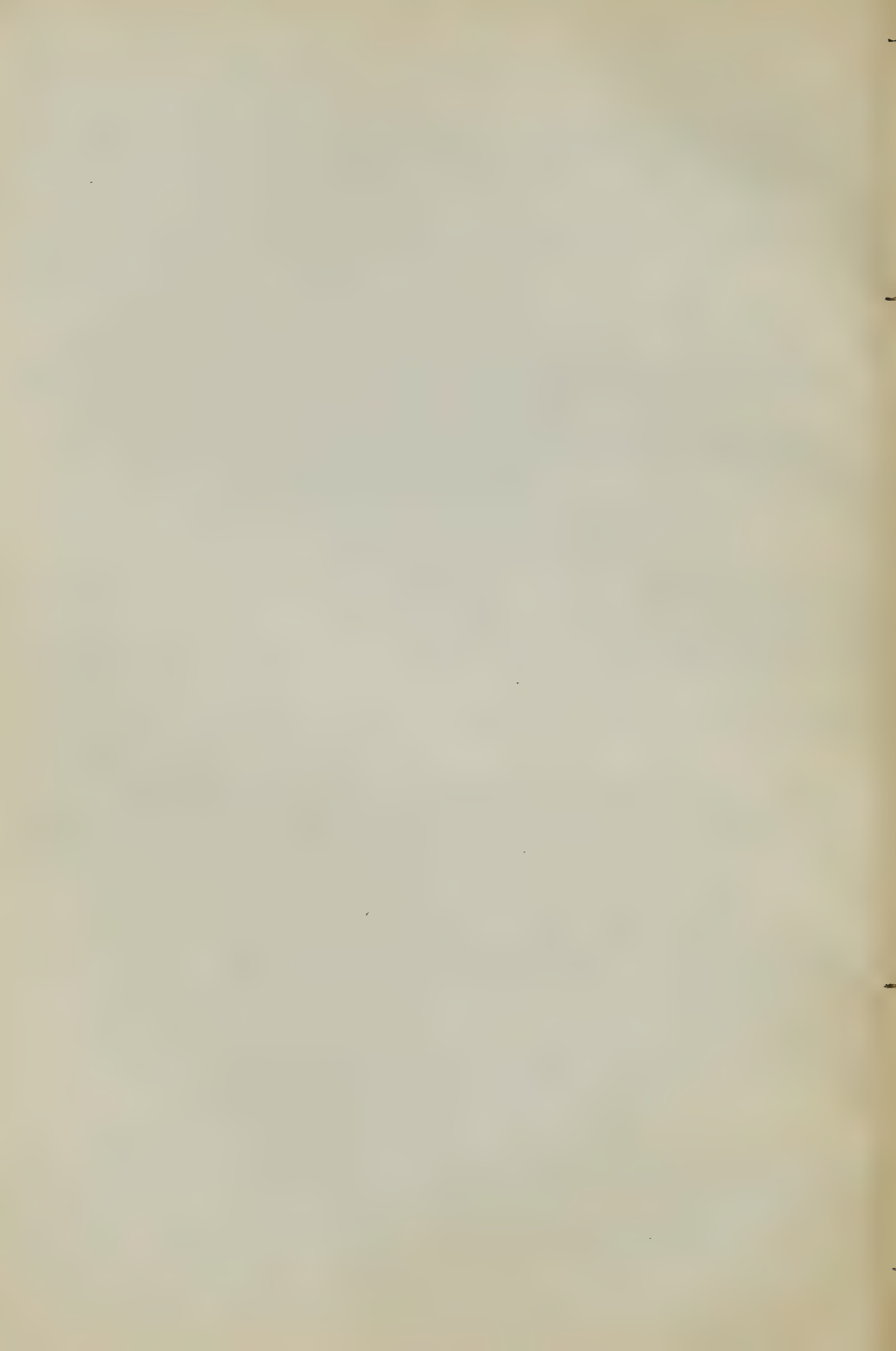
ATTACK IN CLOSE COUNTRY

The attack in close country.

I. T. Cap. 13.—Fight in close country.—Section 139.

1. Close country enables the attacker to approach his enemy with less loss than is usually experienced in more open ground, gives him facilities for screening his movements, and allows him favourable opportunities for surprising his opponent. To reap these advantages the attacker must be accustomed to manœuvre in close country, and must realize and make careful preparation to overcome the difficulties likely to be met.

A thorough reconnaissance is of more than usual importance.



2. Troops detailed for attack should not be prematurely deployed. In close country affording cover from view the advance may be safely carried out in close formation provided the service of protection is properly performed.

3. It is rarely possible in close country to keep the objective in constant view.

Special care is therefore necessary if the direction of the attack is to be preserved.

Even when the objective is clearly visible at the beginning of an attack it is advisable to take precautions in case it may disappear from view.

The desire to make the best use of cover or to pass an obstacle at the easiest place frequently causes infantry to lose direction.

The simplest method of maintaining direction is by guides or in default of guides by compass.

Before infantry advances to the attack in close country the bearing of the objective should be made known to all officers and non-commissioned officers in possession of compasses.

4. Owing to the short range to which the firing line may be able to approach before fire is opened, it must be prepared to meet with strong opposition directly its position is discovered, and must itself be ready to develop a considerable volume of fire at any moment.

5. It may at times be advisable to move supports and reserves forward in file rather than in lines, taking advantage of the concealment offered by hedges, or banks for this purpose.

It must be remembered, however, that hedges leading in the direction of the enemy may become a dangerous trap if enfiladed by hostile fire.

6. In country which is intersected by small woods, high banks, and hedges, troops in one field are often ignorant of what is happening to troops in adjoining fields. In these circumstances co-operation is a matter of difficulty, and can be only insured by careful preparation.

The most effective method of keeping touch when on the move is for the commander of troops in each field to detail men to follow along the boundaries of that field with a view to reporting the movements of neighbouring troops and the development of the situation. These men may also be used as intermediaries in passing orders and messages, when the ordinary means of communication fail.

7. The reorganization of units is specially important in close country. All commanders, however subordinate, must endeavour to minimize the difficulties of control by taking every opportunity to get men in hand.

ATTACK ON A WOOD

Attack on a wood.

I. T. Cap. 13.—Fighting in close country, &c. Section 143.

1. The attack on a wood will consist of one or more of the following three phases, each of which will as a rule be entirely different in character, namely,

- (a) The fight for the edge of the wood,
- (b) The struggle in the interior.
- (c) And the debouching from the wood on the enemy's side.

In the first the attacker will probably have artillery predominance; in the second the guns on both sides can do little to assist; while in the third the defender will usually have superiority in artillery fire.

2. The attack on the edge of a wood differs in no way from the attack on any other position.

When once the edge has been gained, immediate steps must be taken to get the troops in hand, and to guard against a possible counter-attack.

Small parties must at the same time be sent forward to reconnoitre the wood and gain touch with the retreating enemy.

Rides and clearings, especially those which run diagonally in the direction of the enemy; must be examined with particular care before troops emerge on them, as the opposite sides or ends may be held by the enemy, and the attacking force subjected to a heavy frontal or enfilade fire.

3. Machine guns may be usefully employed in the firing line in the interior of a wood, and it may also be possible to bring up small portions of artillery in close support.

4. Particular care must be taken to guard against counter-attacks during the advance through a wood, and to protect the flanks.

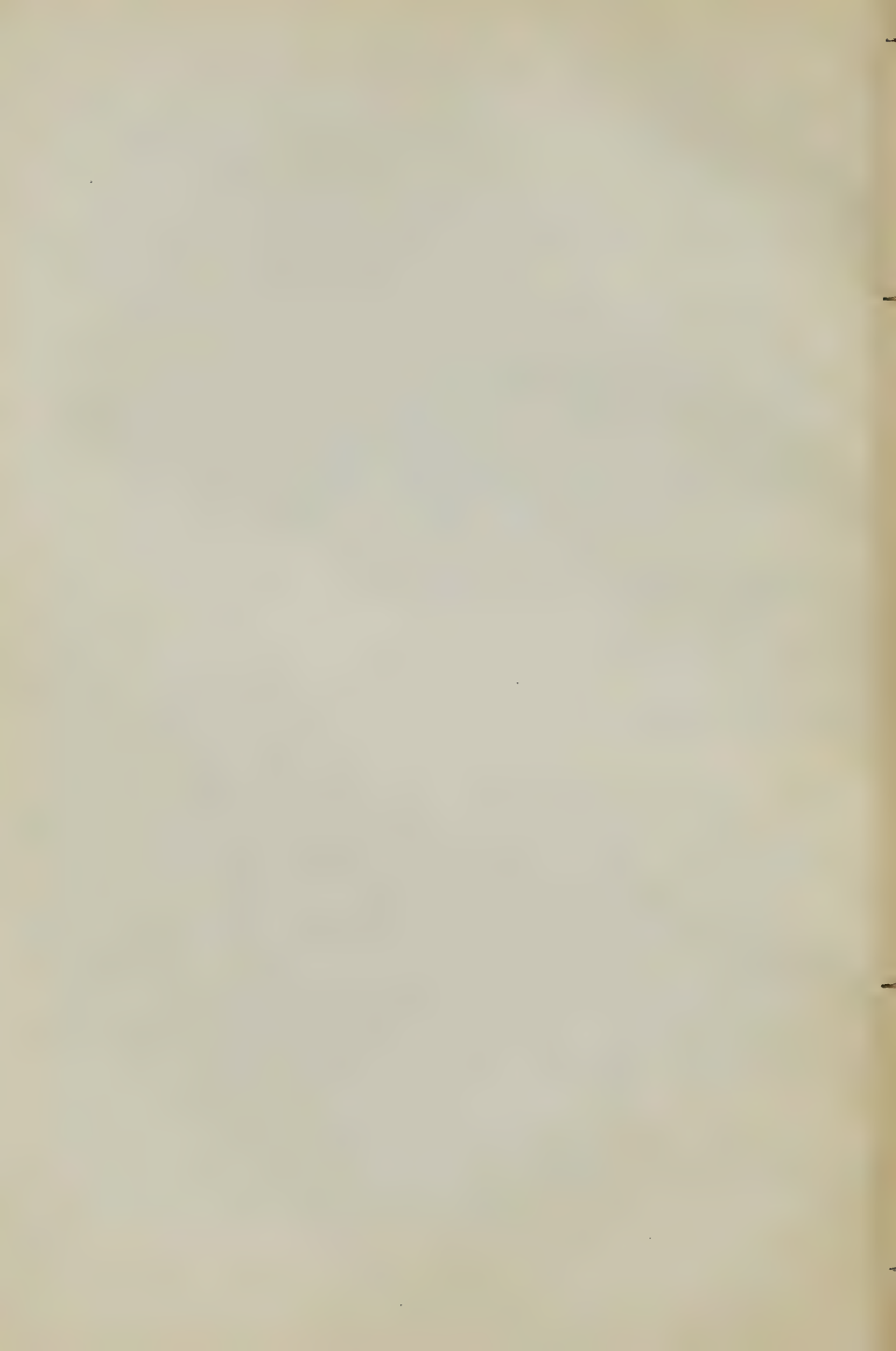
If the wood forms part of an enemy's defensive line, communication must be established with the attacking troops on both flanks, in order to prevent the troops inside the wood from debouching too soon.

5. When available detachments of engineers should accompany troops advancing through woods, in order to assist in the demolition of obstacles.

6. If the enemy can open effective fire on the attackers as they issue from the wood, the outer edge of which may be prepared with abatis and entanglements, the advantage of covered approach will probably be overbalanced by the disadvantage of offering an easy target at a known range, and it may be better to seek another line of advance. If this is not possible, very careful arrangements must be made before attempting to debouch.

Gaps must be made in any obstacles that have been prepared; the troops must be deployed some little distance inside the wood; arrangements must be made for the strongest possible artillery support; and, if possible, the advance of the infantry should be simultaneous with the advance of the attacking troops on either flank of the wood.

When all is ready the infantry should press forward into the open in one rush until the danger zone at the edge of the wood is passed. On such occasions it will, in default of other cover, be better to halt in the open, well clear of the wood, than to pause in the neighbourhood of its edge.



ATTACK ON A VILLAGE

Attack on a village.

I. T. Cay. 13.—Fighting in close country, &c.—Section 145.

1. It may be presumed that an enemy defending a village, whether in front of or forming part of his defensive line, will usually have prepared infantry trenches in front and to the flanks of the village itself.

The conduct of the attack will in its initial stages, therefore, be similar to the attack of any other prepared position.

2. When, however, a village is obstinately defended by the enemy, it may sometimes be advisable, during the later stages of an attack, to mask the village with the troops on its front while neighbouring units press forward on both flanks, rather than to attempt its capture by assault.

3. When the capture of a village is necessary before the units on either flank can advance, recourse to street or house-to-house fighting will sometimes be unavoidable.

As soon as a footing has been gained on the outskirts of the village, the troops must be reorganized in preparation for a further advance, which should be directed simultaneously on to as many points as possible.

The probability of vigorous counter-attacks at this period must be overlooked.

When once the interior of the village has been gained, the struggle will resolve itself into the individual efforts of groups of men; higher control will often be impossible, and subordinate leaders will influence the fight chiefly by their personal example.

Every effort should, however, be made to maintain intercommunication, and this can usually be best achieved by sending back information to some pre-arranged point in rear.

4. All points gained, such as cross roads or important buildings, should at once be strengthened, so that attempts to recapture them may be defeated, and that they may serve as supporting points to a further advance.

5. When once the attacking troops have entered the village, their supporting artillery can be of little assistance, but it may be possible to bring single guns forward to destroy barricades, and generally to assist the advance. Machine guns will also be of great assistance at this time.

6. When the attacking troops are about to emerge from the cover of a village, the same precautions must be taken as described in Section 143, 6, the supporting guns covering the advance by engaging the hostile artillery.

II. DEFENCE — I. THE ACTIVE DEFENCE

1. THE ACTIVE DEFENCE

126. General principles.

I. T. Cap. 11.—Infantry in defence.—Sections 126 to 133 inclusive.

1. The troops will be divided into two main portions:

One, known as the general reserve, to be held in readiness for the initiation of a general offensive when a favourable opportunity has been created.

The other to create the desired opportunity by temporarily taking up a defensive position, and then to co-operate actively with the general reserve in its attack on the enemy.

2. In forming his plan of battle the commander has to determine the relative strength of these two parts, the time and place for the assumption of the offensive by the general reserve, and the general distribution, and methods of action of the remainder of the force. These will all vary with the commander's intentions and will largely depend upon the nature of the ground.

On occasion his plan may be to strike the enemy directly the latter has committed his forces to the attack, and thus lose his power of manœuvre. In such a case it is not likely that a severe strain will be imposed upon the part of the force intended to create the opportunity for attack, which may therefore be comparatively weak or may even attain its object by manœuvring rather than by continuing to hold a definitive position.

At other times the commander may consider that his best chance of victory lies in allowing the enemy to exhaust his strength in endeavouring to capture a strong position before the offensive is assumed. In these circumstances it is necessary that both the position and the force allotted to hold it should be strong enough for the object in view.

3. Whatever may be the strategical situation, the underlying principles of defensive action which aims at decisive results are constant. **No natural or artificial strength of position will of itself compensate for loss of initiative when an enemy has time and liberty to manœuvre. The choice of a position and its preparation must therefore be made with a view to**

economizing the power expended on defence in order that the power of offence may be increased.

4. Every position should be strengthened as far as time admits, with the object of reducing the number of men required to hold it, and of thereby adding to the strength of the general reserve.

5. When it is possible to foresee a considerable time ahead that a suitable position exists which the enemy will be compelled to attack before he can advance further, elaborate preparations may be made for its defence.

When, on the other hand, it is necessary to await the development of the enemy's plans before a suitable position can be selected, or when it is a question of the possibility of drawing him in a desired direction, it will be necessary to trust rather to a detailed reconnaissance of a considerable area of ground, and to arrange various alternative distributions of the force to meet the different courses of action open to the enemy.

127.—The choice of a defensive position

1. When the commander of a force has selected approximately the position to be defended, the next step is to decide on the line to be held and on the extent of front to be occupied.

The object must be to obtain the maximum of fire effect on all ground over which the enemy can advance, with the minimum of exposure to his fire.

An extensive field of fire from the position offers many advantages, but if the enemy be very superior in artillery a restricted field of fire combined with comparative security from his guns may give better results.

It is difficult for attacking infantry to push home an assault against determined troops well protected from artillery fire even if the defenders have only a field of fire a few hundred yards in depth.

2. The extent of the front of the position must be proportionate to the object in view (i.e., to the plan of battle) and to the force available.

If the frontage occupied in battle is so great as to reduce the force kept in hand for the ultimate initiation of the offensive much below half the total force available, the position may be considered too extended to be held with a view to decisive action.

On the other hand, too narrow a front may enable the enemy to develop early in the engagement strong flank attacks, which may make the position untenable before the time is ripe for the assumption of the offensive.

The flanks are always the weakest part of a position if they are open to attack, and an extension of front which, under other conditions, would be excessive, may be advisable if it enables one or both flanks to be posted strongly.

If the flanks can be made sufficiently strong the enemy may be forced to attempt to drive his assault home against the front of the position.

It is a great advantage if one flank, at least, can be posted so strongly as to compel the enemy to make his main efforts against the other, as this will usually enable the defender to foresee the probable direction of the enemy's main attack and to make his dispositions accordingly.

3. Behind the firing line it is important to have sufficient depth for manoeuvre.

There should be good cover for supports and local reserves, and the nature of the ground should permit of these being moved either to the front or to a flank as may be required.

4. A position fulfilling all requirements can seldom, if ever, be found. It will always be necessary in selecting one to balance various advantages and disadvantages. **But since, in active defence, the position is held only as a means of creating a favourable opportunity for eventual offensive, it is essential that the position should be chosen with a view to facilities for launching the attack. Unless there be favourable ground for this, the position cannot be considered a suitable one for the object in view.**

128.—The distribution of the troops detailed to defend the position.

1. When a position is extensive it should be divided into sections, each of which should be assigned to a distinct unit.

The extent of a section depends on the power of control of one commander, and must therefore vary according to the nature of the ground. It will be rare, however, even in the case of large forces, for the infantry garrison of a section to be more than a brigade.

2. The troops allotted to the defence of each section of the position will be divided, as in the attack, into (i) firing line and, if necessary, supports, and (ii) local reserves (*).

3. The factors which affect the extent of frontage which may be held by the troops allotted to the defence of each section of the position are as varied as those which affect the question of frontage in attack.

Even when the utmost development of rifle fire is required, not more than one man per yard can usefully be employed in one line.

The number of men detailed for the firing line and supports of any section should therefore rarely exceed the number of yards in the total frontage of the section.

When the ground is naturally very favourable to defence or can be made so artificially a less dense line should be sufficient, and not a man more than necessary should be used for this purpose.

The strength of the local reserves may be estimated roughly at about that of the firing line and supports, but must depend on the facilities for defence and offence offered by the ground, and upon the extent to which it has been possible to strengthen the position.

4. The commander of each section will detail the number of men required for the occupation of localities or portions of the front, and will keep the remainder of the troops allotted to him under his own orders as a local reserve.

5. The units allotted to the defence of localities or of portions of the front,

(* The case considered here is that of a position divided into sections. When a position is not so divided, the action of the officer responsible for the defence of the whole position will be similar to the action of a commander of a section of the defence herein described.)

will find the firing line and supports. But although the provisions and action of local reserves are the special business of commanders of sections of the defence, commanders of battalions included in such sections may also hold small local reserves in their own hands and undertake minor local counter-attacks with them when the conditions appear to be favourable for such action.

For instance, portions of a position where the conditions are unfavourable to a direct defence, may sometimes be better defended by means of local reserves than by strengthening the firing line.

6. Local reserves should not be employed to reinforce the firing line; every man in the firing line should be made to understand that assistance will be given if required in the form of a local counter-attack (*see* Sec. 131, 3).

129.—The preparation of the position for defence.

1. Defensive positions will usually include a number of localities of special tactical importance.

The efforts of the defender will be directed in the first instance to occupying and securing these points, so that they may form pivots upon which to hinge the defence of the remainder of the position.

The defences of these localities should be arranged so that they may give each other mutual support, and should always be allotted to a definite unit.

If these points are naturally strong or can be made so artificially, and if they are adequately garrisoned, so as to form a framework against which the enemy must expend his strength, the intervening ground need not be held in a continuous line.

The object should rather be to utilize this intervening ground for local counter-attacks, while arranging for either direct or flanking fire, or both, within such ranges as may be decided on, to be brought to bear on all ground over which the enemy may advance.

A defensive position prepared in this manner lends itself to local counter-attacks, which keep alive an offensive spirit in the defenders, exhaust the enemy's powers, draw in his reserves, and thus prepare the way for the assumption of the offensive.

2. Where a defensive position is to be held at night or during fog, it will usually be necessary to supplement the system of occupying localities, described above, by a more continuous line of defence in order to prevent the enemy from penetrating the position.

When a battle begun in daylight is not decided at dusk, it may be justifiable to employ local reserves to occupy the gaps in a defensive line. In any case the dispositions suitable for day will rarely be equally suitable for night, and it may be necessary to rearrange the defence.

3 The methods of preparing and entrenching localities and the various types of trenches are described in the Manual of Field Engineering.

The preliminary measures should be based upon as thorough a reconnaissance as is possible by each commander of the area for which he is responsible.

The first step in the work of preparation is to improve the field of fire, both by clearing the foreground and by taking ranges to all prominent objects.

These ranges may be supplemented by fixing range marks, with which, as well as with the ranges taken, the troops should be made familiar.

Range cards (Plate XVII) will be found useful by infantry when occupying posts or positions of any kind, including outpost positions; they should be handed over to relieving units. Objects in or near the position, which might assist the enemy in ascertaining the range, should be removed if possible.

4. The chief point to keep in view in providing cover is that the fire from it should be effective, but facilities for concealment, control, communication and for the supply of ammunition, food, and water must also be considered.

The concealment of trenches usually requires special measures. They should not be sited in exposed positions, such as the tops of bare hills or of prominent salients, if this can be avoided, and all excavations should be made to assimilate the background.

Salients and advanced posts which are held in order to deny ground to the enemy, and not merely as a screen to the main position, are a weakness if they are exposed to artillery fire which cannot be answered, and if they cannot be supported by effective infantry fire.

As a general rule it is better to leave such positions unoccupied, and for the ground between them and the main position to be defended by fire from the main position.

On the other hand, advanced posts which can be supported effectively by fire from the main position are often of value in breaking up an attack.

Generally speaking, it is easier to arrange covered communication with high-sited trenches, but these often entail a certain amount of dead ground in front of the position.

It is sometimes possible to avoid this by arranging for the fire from one trench to sweep the ground in front of another and **vice versa**, but too much reliance should not be placed on this method as it is difficult for the garrison of a trench which is being heavily attacked to fire in any other direction than that of its immediate opponents.

Trenches placed at the foot of slopes are more easily concealed and admit of a more grazing fire than high-sited trenches. They are therefore usually preferable, even though the supply of reinforcements, ammunition, food, and water to their garrison may involve difficulties.

Trenches which can bring fire to bear at close range on to the ground over which the attack must pass, and which are themselves concealed from the attackers in the early stages, are most valuable in surprising the enemy at critical periods.

5. The general position and extent of obstacles will be decided by the commander of each section, who in fixing their position and nature must bear in mind the need for facilities for local counter-attack and for the eventual assumption of the offensive.

6. Deep trenches in covered positions in rear of the fire trenches may be usefully provided for that part of the firing line which it is decided to hold in support, or for the whole garrison of the advanced trenches till it is required. When garrisons are thus held back, a few men must be posted in the trenches

to keep a look out, and communicating trenches will usually be a necessary addition, in order to ensure covered connection with the fire trenches.

If it is not possible to provide cover and communications for the supports, the latter may be merged in the firing line from the outset.

Local reserves should be posted under natural cover if available, and their rapid movement in any direction in which they may be required must be facilitated.

If it is necessary to make artificial cover for reserves it must be made clear that this is not a secondary position, but that the cover is merely prepared to shelter the troops until they are required.

7. Buildings, villages, and woods are particular forms of the defensive localities referred to in paragraph 1 of this section. The commander of the section in which they are will normally decide whether they are to be occupied or not. Buildings, when naturally strong or properly prepared are of great value in the defence, but they may form an easy target if exposed to artillery fire. Usually therefore, they should not be actually held, except by look-out men, when under artillery fire, but should be prepared for occupation when the enemy's artillery fire ceases, and garrisons should be held ready for the purpose. (See also Chapter XIII.)

130.—Use of covering troops.

1. The skilful use of covering troops will often assist the defender in concealing his dispositions and in surprising the enemy.

2. The cavalry, **supported by the other arms when necessary**, may do much to screen the main position, to mislead the hostile commander as to its exact situation and extent, to induce him to deploy prematurely, and to fatigue his troops in groping for skilfully covered flanks, while his uncertainty will be prolonged if the troops occupying the main position are carefully concealed and withhold their fire until the last possible moment.

3. Covering troops employed in this way should be withdrawn in time to prevent them from becoming closely engaged and from masking the fire from the main position. The commander of the covering troops should be given clear instructions on these points.

The decision to employ covering troops rests normally with the commander of the force, but commanders of sections are at liberty to deal with special features, such as woods and villages (see Chapter XIII), in front of their positions, by pushing forward detachments to break up the enemy's advance, to command otherwise dead ground, to induce a premature deployment, or to create opportunities for local counter-attacks. The objection to the use of such localities for this purpose is the difficulty of choosing the right moment for withdrawal. If the garrison withdraws too soon only half its work will be completed; if too late it may not be able to make good its retirement, and other troops sent to its assistance may be involved in action in disadvantageous circumstances.

131.—The conduct of the infantry fight in the defence of a position.

1. A favourable opportunity for assuming the offensive may occur early or may be long deferred. In either case the chance of success depends largely on the troops allotted to the position holding it against all attacks, without calling for reinforcements.

2. The duty of the firing line is to prevent the enemy from advancing on to the position and to exhaust him by an obstinate and determined defence of the ground allotted to it, thus preparing for the ultimate offensive.

The general principles governing the use and control of fire in the defence have been described in Secs. 116 and 117.

Subordinate commanders with the firing line will decide when bayonet are to be fixed, in accordance with the local conditions of the combat and the nature of the ground, but this should be done before the enemy reaches a position from which it is possible to carry out the assault.

Any part of the firing line kept back in support will be used to replace casualties in the front line and to infuse fresh vigour into the defence.

3. The enemy will not ordinarily make a serious attempt to drive his attack home at all points, and it is important to discover, as soon as possible, where he intends to apply his main strength.

Before either side can deliver a decisive attack it is to be expected that there will be a prolonged fight for fire superiority.

During this struggle the object to be aimed at is not merely to wear down the enemy's firing line until it is incapable of further advance, but **to drive it back so that the enemy may be forced to use up his local reserves to restore the battle. This can be done by means of vigorous local counter-attacks' delivered whenever a suitable opportunity occurs**

Such opportunities will arise when the enemy's firing line comes within reach without sufficient support, and when fire superiority, even though only temporary, has been gained.

Local counter-attacks may be initiated by any commander who keeps local reserves in his hands, but the most important will be those carried out by the reserves of sections under the direction of the commanders of sections of the defence.

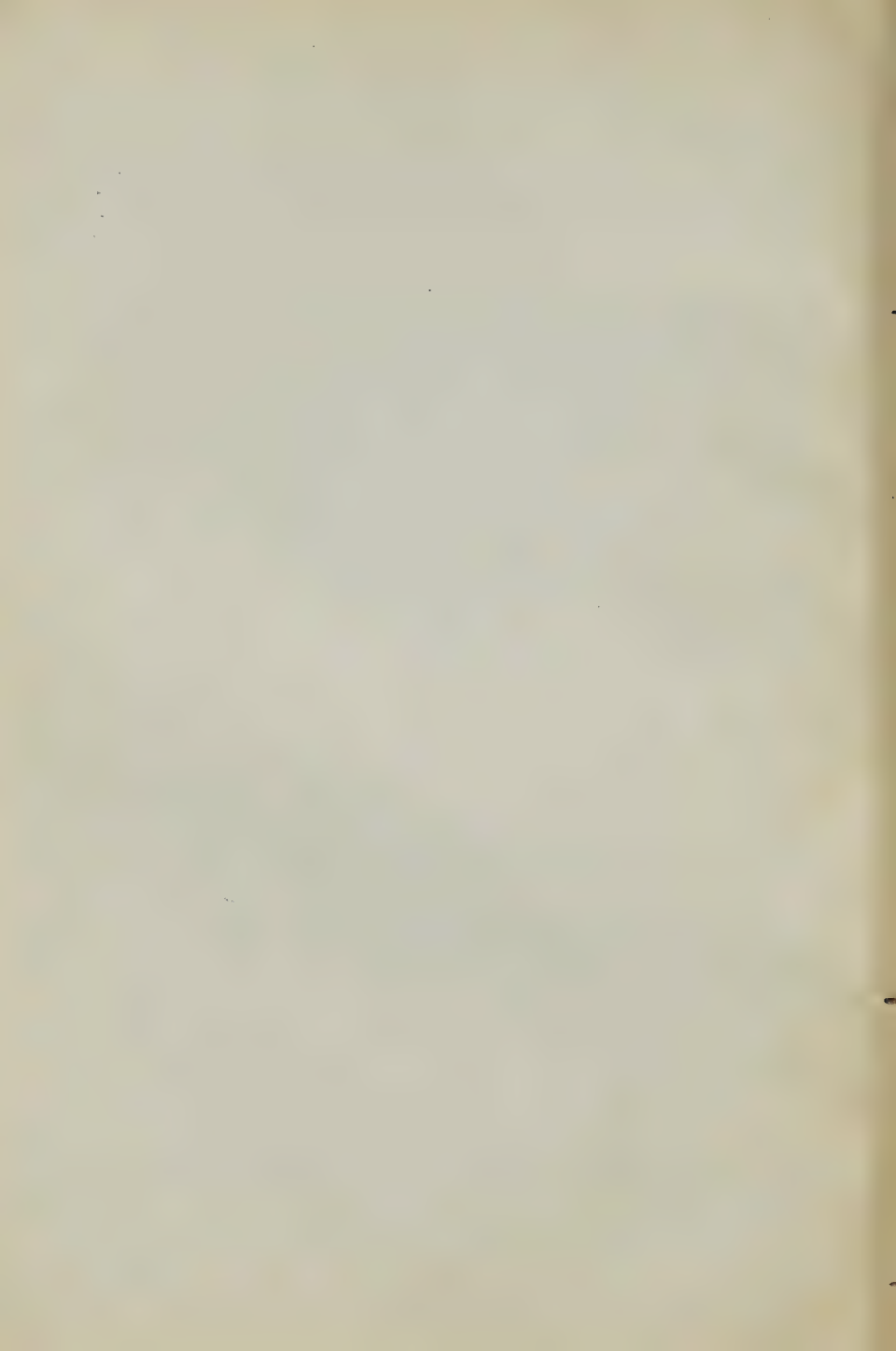
To achieve its purpose a local counter-attack should compel the enemy to expend more force than is involved in its delivery.

Counter-attacks against strong tactical points are, therefore, usually inadvisable, and for the same reason success should not be followed up too far.

Officers in command of local reserves should previously reconnoitre the ground over which they may have to lead a counter-attack, and must, by carefully watching the progress of the fight, and by arranging beforehand for the co-operation of other units, including artillery, be ready for instant action when a favourable opportunity occurs.

The danger to be guarded against is that troops may go too far and get out of hand.

Before starting, therefore, commanders of local reserves must decide the



approximate distance that the attack is to go, and must see that this is understood by all ranks.

They must also consider beforehand the means of covering their subsequent withdrawal, and it will sometimes be advisable to keep back a small portion of their force for this purpose.

4. In a bayonet fight the impetus of a charging line gives it moral and physical advantages over a stationary line.

Infantry on the defensive should therefore always be ready to meet a bayonet charge by a counter-charge. This counter-charge, however, should not be made prematurely.

The enemy cannot fire effectively while charging, and can rarely be well supported by covering fire.

He thus offers at such a time a very vulnerable target, of which advantage should be taken so long as a steady and well directed fire can be brought to bear on him.

Should, however, the volume of fire be insufficient to check the assailant, **a counter-charge must be made before he has actually reached the position.** When it is made success will fall to the line which is best in hand and charges with most spirit and determination.

132.—The battalion in the active defence.

1. The battalion commander, in arranging for the defence of a portion of a position, will be guided by the principles given in the preceding sections.

When acting with other battalions in the defence of a section, it will depend upon local conditions whether he keeps a local reserve in his hands or not (**see Sec. 128, 5**). His method of issuing orders will be similar to that described for the attack.

2. If acting alone, his chief object will be to defend the position with the fewest possible numbers in order to have in his hands as strong as possible a force with which to assume the offensive.

3. The duties of company, platoon, and section commanders are generally similar to their duties in the attack (**see Sec. 123**).

Care must be taken that the trenches are concealed from the enemy, that ranges are taken and communicated to the men, that ample ammunition and water is available, and that look-out men are posted to watch the front before the enemy approaches and during pauses in the attack.

133.—The assumption of the offensive.

1. A commander who decides upon an active defence, changes from the defensive to the offensive by launching his general reserve

The considerations which affect the size, composition, and position of this force and the questions of the choice of the time for launching the attack, and of the direction which it should take, are dealt with in Field Service Regulations Part, I.

2. The methods of the general reserve when assuming the offensive from the defensive are generally similar to those described in Sec. 121. But since the object in view is to take advantage of a favourable opportunity, which will usually be fleeting, many of the preliminary measures, which are desirable before a more deliberate attack is launched, must be dispensed with. (See Sec. 122. 4.)

The action of the infantry must therefore be most vigorous and the firing line must from the outset be as strong as possible.

3. There will probably be little time for issuing detailed orders, but the direction and manner of carrying out the attack should be carefully pointed out to all subordinate commanders, who will explain the same to the troops, and impress on them the importance of getting to close quarters quickly.

4. In order that no time may be lost when the moment for action arrives, commanders of troops allotted to the general reserve should take every opportunity beforehand of reconnoitring ground over which they may have to act and of explaining the situation to their subordinates.

5. The assumption of the offensive should not be confined to the advance of the general reserve alone. Commanders of sections of the defence who are permitted by the local situation to do so must at once join actively in the attack unless express orders to the contrary have been received, and any decisive success which the movement obtains must be the signal for the whole force to press the enemy with the utmost vigour.

II.—DEFENCE. I.—ACTIVE DEFENCE.

(A) SITING AND DIGGING TRENCHES

EARTHWORKS

Manual of Field Engineering, Chap. V.

(See also F.S. Regs., Pt. I, Sec. 108, and Military Engineering, Pr. I, Sec. 8.)

28.—General Instructions

1. Earthworks may be classed generally under three heads, viz.:—Trenches Redoubts, and Gun Emplacements.

Trenches are further distinguished as “fire trenches” or “cover trenches” according as they are for the firing line or for troops not actually engaged. “Communication trenches” are excavated covered ways connecting different parts of a position.

2. The value of concealment cannot be over-estimated, and every effort must be made to conceal the site of all earthworks in a position. It should be always borne in mind that invisibility is often as valuable as cover itself, while one carelessly constructed trench may give the enemy a good idea of the whole position.

The curves of parapets should be made to assimilate with the natural contour of the ground. Straight lines and sharp angles are, therefore, out of place. The fronts of parapets should be carefully covered with sods, transplanted bushes, &c., to make them resemble their surroundings. Cut branches become very conspicuous when withered, and if used should be changed by night.

3. If a parapet is placed on the sky line, spare earth may be piled up behind the trench and covered with turf, bushes, &c., to make a background for the defenders' heads, and to conceal its position. As a rule, however, a sky line is to be avoided. In this connection it must be borne in mind that the sky line will vary according to the spot from which the position is regarded. As it is usually most important that trenches, &c., should not be placed on what would be the sky line to the attacking artillery, the position should, if possible, be examined whilst the siting of the trenches is under consideration, from the positions most likely to be occupied by the attacker's guns. It is not necessary that entrenchments should be of equal strength throughout a position. Such portions of the position as are liable to detection as the result of a distant examination by the enemy should receive earlier and more careful attention than those parts which will not be seen until he has drawn closer.

4. All earthworks, whether completed or not, must be concealed as far as possible, and all tools, materials, and signs of work in progress removed or concealed on each occasion that work proceeding in the presence, or possible presence, of the enemy, is suspended for a longer period than for a routine relief of the working parties.

5. Entrenchments will be used in attack as well as in defence. The main difference between the nature of the works constructed is that in the latter case the position will usually be selected and the work carried out more or less deliberately before fighting begins, while in the former all work will be carried out hastily on ground which may not have been closely reconnoitred beforehand. (See also F.S. Regs., Pt. 1, Sec. 105.)

6. While the principles of the tactical employment of earthworks must always be borne in mind, the works illustrated in the plates should be regarded as types only and should be varied to suit local conditions, every effort being made to save time, labour and material by utilizing and improving existing cover.

29.—Fire Trenches

1. The ideal site for a trench is one from which the best fire effect can be obtained, in combination with complete concealment of the trench, and of the movements of supports and reserves in rear. Such positions being rarely found, the best compromise must be sought, bearing in mind that a good field of fire up to about 400 yards is of primary importance.

2. When the position includes commanding ground the firing line need not necessarily be on it. The advantage of high ground for a defensive position is over-estimated. It is, however, desirable that the position should conceal and shelter the defender's reserves and communications, while enabling the movements of the enemy to be observed.

3. It may sometimes be advisable to place the infantry fire trenches at or near the foot of a slope so as to obtain a grazing fire, while the artillery is posted on higher ground in rear. It must, however, be remembered that it will be difficult, if not impossible, to reinforce the defenders of such trenches, or to supply them with ammunition, water, food, etc., during daylight.

4. **Provided the field of fire is good, a parapet cannot be too low, and in some cases no parapet at all need be provided.** Every endeavour should be made to arrange the trenches so that the front of one is swept by the fire from those on either hand, for which purpose short trenches up to 40 yards or so in length are more easily adapted to the ground than those of greater length. (Pl. 18.)

Earth which is not required should be carried away to some spot under cover, or formed into dummy parapets. If wheelbarrows are not available, earth may be carried away in sandbags or in squares of matting, etc., slung to a pole.

5. Every artifice should be used to mislead the enemy as to the positions of the trenches and guns, e.g., conspicuous dummy parapets, not in the alignment of either real fire trenches, or of closely supporting artillery, may be thrown up to draw his fire, and may also be equipped with dummy guns, paper masks, helmets, etc. They would be specially suitable if used in conjunction with a false or advanced position. (See Sec. 50 (10).)

Scrub, long grass, etc., forming a natural screen to trenches should not be trampled down or otherwise interfered with more than is absolutely necessary to give a clear field of fire.

6. Turf which may be needed should be taken from some unseen spot, or it may be possible to take it from a strip of ground, which with a little labour may be made to resemble a trench. Turf used for concealing parapets should be laid so that spaces do not occur between adjacent sods.

7. The **design** of a trench will depend on the time and labour available, on the soil, on the site, and on the range and description of fire which may be brought to bear on it, but the following rules are common to all:—

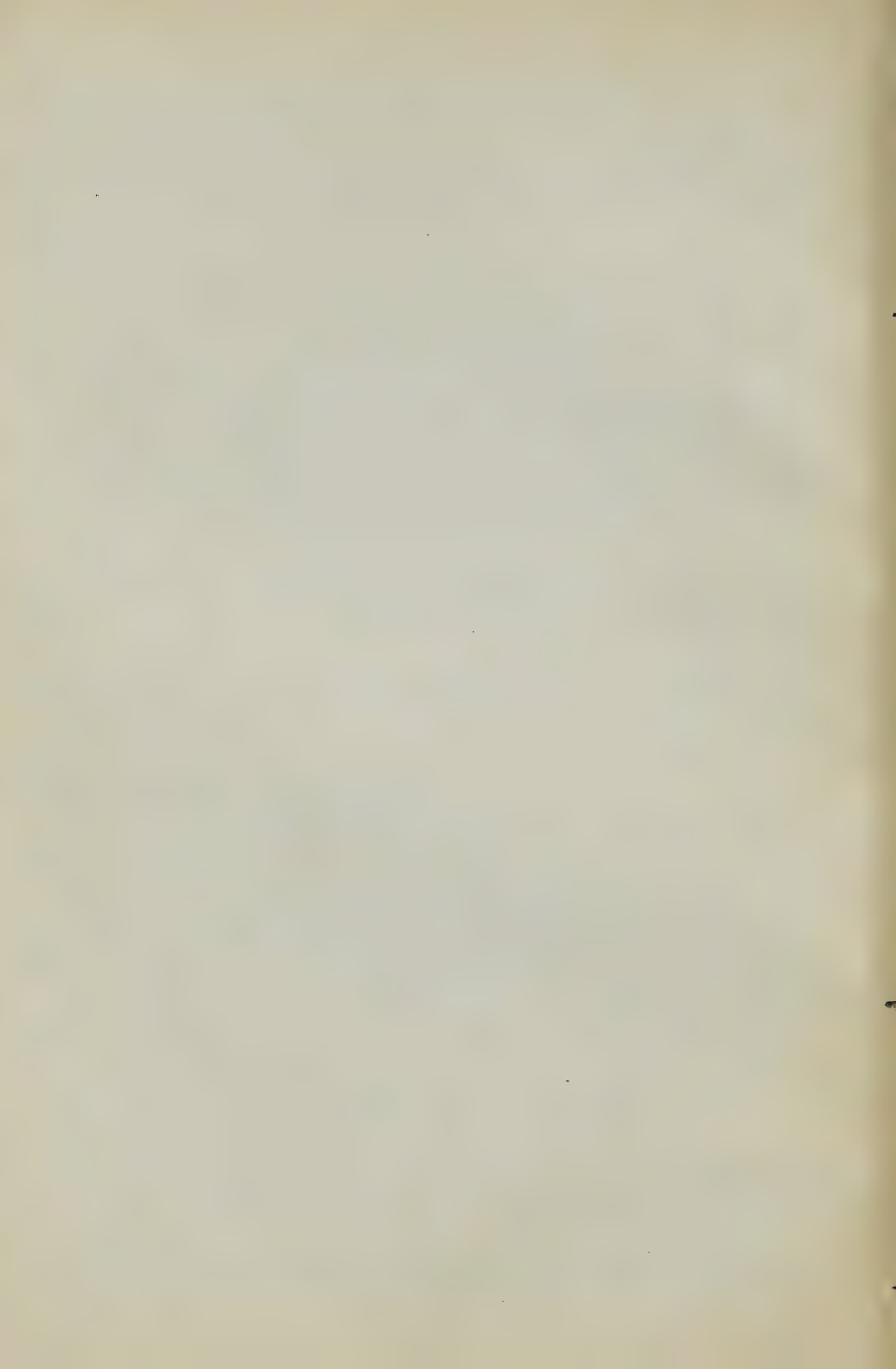
(1) The parapet should be bullet proof at the top.

(2) The parapet and trench should be as inconspicuous as possible.

(3) The interior slope should be as steep as possible.

(4) The trench should usually be wide enough to admit of the passage of a stretcher without interfering with the men firing, and if a step is provided as a banquette, it should not exceed 18 inches in width. (Pl. 9, Fig. 3.)

(5) The interior should be protected, as far as possible, against oblique and enfilade fire, and from reverse fire if there is a danger of fire coming from the rear.



(6) Arrangements for drainage should be made.

8. Types of fire trenches are given in Pl. 9.

To excavate a length of 2 paces per digger of a trench of the type shown in Fig. 1, will take an untrained man about $1\frac{1}{2}$ hours, in moderately easy ground. This does not allow for providing an elbow rest or concealing the parapet.

Should time be available, cover and facility of communication may be much improved by deepening and widening the trench, as shown on Pl. 9, Fig. 3, which allows room for men to pass behind the firing line without disturbing it.

Should a higher command than 1 foot 6 inches be required to enable the defenders to see the ground in front, the parapet must be heightened with earth obtained by widening and deepening the trench. A firing step, which should not exceed $1\frac{1}{2}$ feet wide, unless overhead cover is provided, is necessary $4\frac{1}{2}$ feet below the top of the parapet; the interior slope of this step must be revetted.

Pl. 9, Fig. 2, is a case where the ground in front can be seen without any command. For the sake of concealment the excavated earth must be removed or formed into a dummy parapet elsewhere, and the back inside edge of the trench covered up with grass, sods, etc.

9. When entrenching under fire, or in the attack, each man should provide himself with cover as quickly as possible. Pl. 9, Figs. 4 and 5, shows how fairly good cover can be rapidly obtained for individual men lying down. Sodds and lumps of earth should be used to revet the inner slope of the parapet. If more time is available the trenches can be improved and deepened as shown by the dotted lines.

In constructing fire trenches in the presence of the enemy, care must be taken to utilize the earth as it is excavated so as gradually to improve the cover provided. It must not be thrown haphazard to the front with a view to subsequent arrangement.

10. An elbow rest is useful because it supports the arm while firing, and is convenient for ammunition, but it is wasteful of head cover, and the vertical exposure of the firer is greater than when no elbow rest is used. It should be 9 inches below the crest and 18 inches wide.

11. Fire trenches should usually be provided with small recesses in which to place packets of ammunition. These will also serve as steps by which to reach the crest, should an advance be ordered. (Pl. 9, Fig. 2.)

12. Ramming earth decreases its resistance to bullets; it should, therefore be allowed to lie naturally as thrown up, except in the case of shelters constructed under a parapet (Pl. 12, Fig. 3), when some ramming may be advisable to prevent water percolating into them.

30.—Entrenching in Frozen Ground

1. If it is necessary to entrench ground which is frozen, and if there is ample time, the following method will save the heavy labour otherwise required.

A layer of straw 12 to 20 inches thick should be spread so as to rather more than cover the area to be excavated. The straw, having first been covered by a thin layer of earth, is then set on fire at intervals of about 5 yards. The burning

should be allowed to go on for 12 hours before the ashes are removed, and digging commences.

2. If water is poured over a parapet constructed during frost its resistance to rifle fire will be increased.

3. The sound of digging in frozen ground can be heard at a distance of about half a mile, while the sparks caused by picks striking stones have been seen up to about 600 yards.

31.—Loopholes.

1. Head cover necessitates the provision of some form of loophole or notch but tends to diminish the number of rifles that can be put in line, as well as to reduce the field of fire and view. It generally makes the work more conspicuous, but is of undoubted advantage owing to the feeling of security it inspires, and consequent greater accuracy of fire.

2. Careful arrangement is necessary to ensure the maximum of fire effect and invisibility.

Invisibility is the first consideration during the early stages of the battle and at long ranges, while cover increases in importance as ranges diminish; it may, therefore, occasionally be advisable not to construct head cover at first, but to have materials, such as filled sandbags, ready in the trenches to enable this to be done when further concealment is useless.

3. Loopholes can be made of sandbags, sods, or various other materials such as boxes or sacks filled with earth, or gravel.

The size and shape of the opening must be governed by the extent of ground to be covered by fire, but it will also depend on the width of the parapet, which will vary according to the resisting power of the material used in its construction.

The minimum level ground using the service rifle at 2,000 yards range, is, for the inside, six inches; for the outside, four inches. The interior height of an earth loophole should be less than 14 inches. This additional allowance is made to enable men to get their heads well forward and under the head cover.

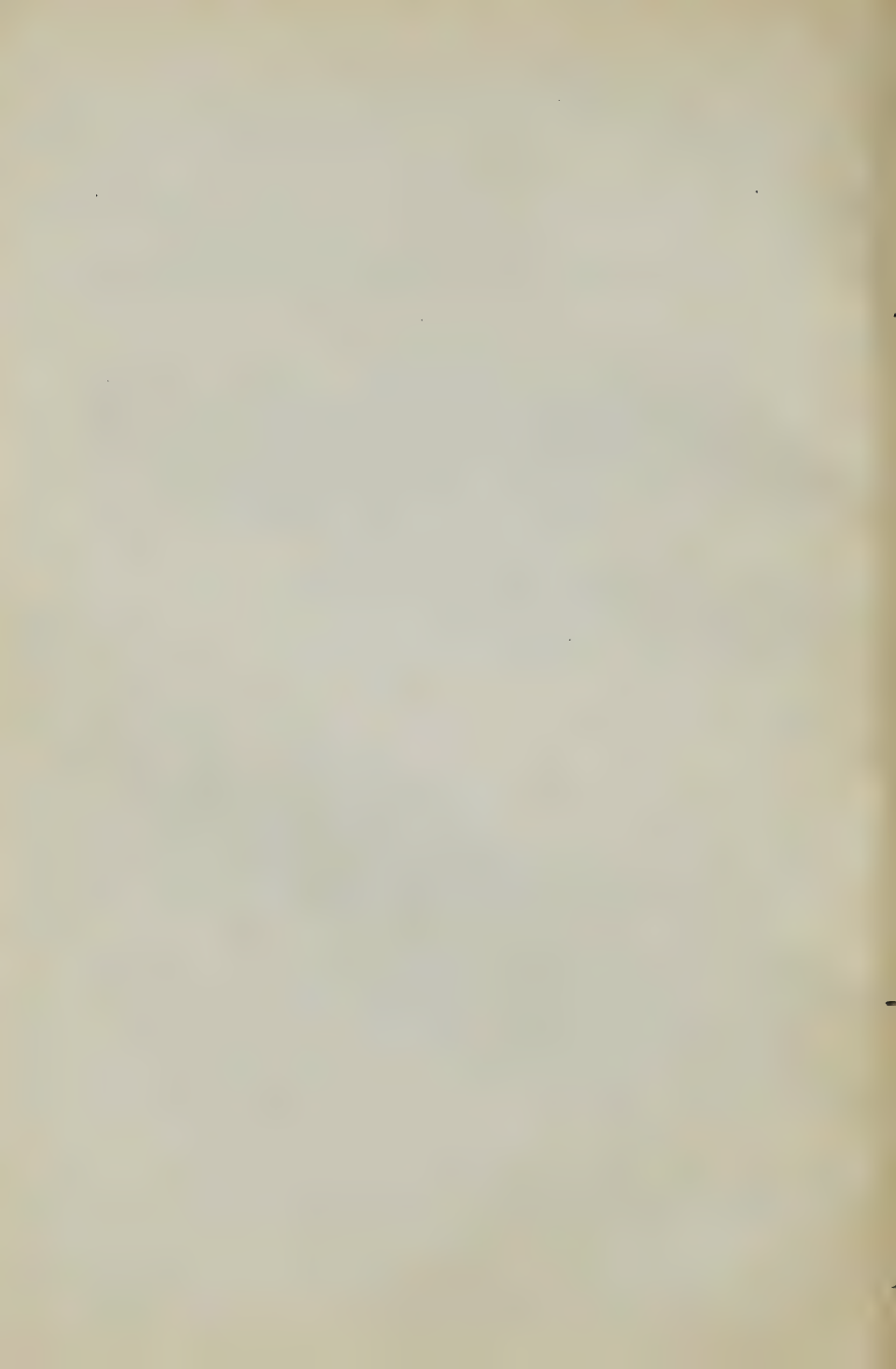
Each loophole must be tested with a rifle, with the bolt removed, to ensure that neither the line of sight nor the line of fire are obstructed.

4. Loopholes should always be blinded by means of a ball of grass, straw or leaves, until they are actually manned. The shadow thrown by the loophole, as well as the hole itself, may be masked by light screens of branches, heather dry grass, etc. (Pl. 11, Figs. 1 and 2), but it is little use concealing the loopholes if the parapet itself is conspicuous.

5. If the trench is sited for firing downhill, the parapet must be sloped off to the lowest line of fire, before commencing the loopholes. This principle should be equally observed in the case of parapets in elevated positions, or when it is required to fire uphill.

6. Pl. 10, Fig. 1., shows the three types (A.B. and C.) of loophole which are usually employed.

Loopholes of type A give the defender a good view, and enable him to fire



on any point within the angle of opening without moving his position to any great extent. This type of loophole is difficult to conceal, and, if covered in, the top sandbags require strong support to prevent them sagging. (Pl. 10, Fig. 2)

Loopholes of type B are less visible to the enemy, but they are more difficult to observe from and fire through. They are suitable for use in masonry walls, etc. (Pl. 10, Figs. 3 to 5.)

Loopholes of type C (Pl. 11, Fig. 3) are a compromise between the first two types and can be adapted to give a large field of fire. Thickening the parapet reduces the area round the loophole which can be penetrated by bullets. This is not the case with the first two types.

7. If there is a supply of shingle or gravel available, loopholes may be made as follows:—Place one sandbag inside another, and fill the inner one with the shingle. Three of these double sandbags will make a loophole, and the rest of the headcover can be revetted with single sandbags filled with stones. The sandbags forming the loophole should be placed on edge and stamped or hammered out until the opening is curved as shown, and the bag is about 9" wide and 6" high. This loophole requires comparatively few sandbags, and the parapet does not require any extra thickness of earth, while the loopholes can be as close as 3' 3". (Pl. 11, Figs. 1 and 2.)

8. A form of loophole which has the advantage of giving a wide field of fire and view is a continuous slit along the parapet, except for the supports required for the material above. (Pl. 25, Figs. 2 and 3.)

9. Steel loophole plates are articles of store (Pl. 10, Fig. 6.) They may be arranged as shown on Pl. 11, Fig. 3. They make the best head cover, as they are bullet proof, but they would rarely be available for hasty defence work. In the vicinity of railways a strong steel loophole can be made with a string of fish-plates threaded on a rod.

32.—Drainage of Trenches

1. The drainage of trenches must be attended to from the first. The bottom of a trench should be sloped to a gutter, which should preferably be made along the back of the trench. Any water collecting in it should be let off to lower ground, or else into soak pits, which may be about 2 or 3 feet in diameter and 3 feet deep, and filled with large stones. Care must be taken to prevent rain water running into the trenches from the surrounding ground.

33.—Traverses

1. Trenches exposed to enfilade fire and to oblique fire of artillery, should be traversed and recessed. Traverses give protection against enfilade fire, and also localize the effect of a shell bursting in the trench. (Pl. 12, Figs. 1 2 and 3.) It is better to make several small traverses than one or two large ones. When the ground is suitable, an irregular line of trenches may obviate the construction of traverses, but the best lines of fire must never be sacrificed for this reason. Against oblique or enfilade fire from long ranges, traverses alone will not suffice, on account of the steep angle of descent of the bullets, and overhead cover

may be necessary. Recesses in the parapet, large enough to hold one or two men, give protection against such fire, but seriously reduce the number of rifles that can be employed. (Pl. 13, Fig. 1.) Such recesses are best made after the trench has been excavated.

34.—Communication Trenches

1. If time admits, covered communications must be arranged from the firing line to the rear (Pl. 16.) These, by concealing the movements of the defenders, will permit of the firing line being reduced to a minimum in cases where it is being attacked by artillery fire alone, or where the attacking infantry is out of range, and will also enable the supports to reach the firing line under cover. A trench similar to Pl. 12, Fig. 4, will usually suffice.

Time and labour in the construction of these trenches will be economized by a skilful use of the ground and by reducing the distance between the cover for the supports and firing line as much as possible.

They may require parapets on both sides, and where exposed to view or enfilade fire should be traversed and given overhead cover. (Pl. 16.)

2. In positions where their employment as fire trenches might subsequently be desirable, trenches similar to Pl. 9, Fig. 1, may be used.

3. For advancing towards the enemy by means of covered communications leading from the firing line **to the front**, see Mil. Eng., Part II, Secs. 4 and 5.

35.—Cover Trenches

Cover trenches are useful to protect anymen who are not using their rifles. When time is limited and materials are not at hand, a section similar to Pl. 9, Fig. 7, but with slightly higher parapet and no elbow rest, may be employed. If more time and material be available, trenches similar to those shown on Pl. 9, Fig. 3, and Pl. 20, Figs. 1 and 2, should be used.

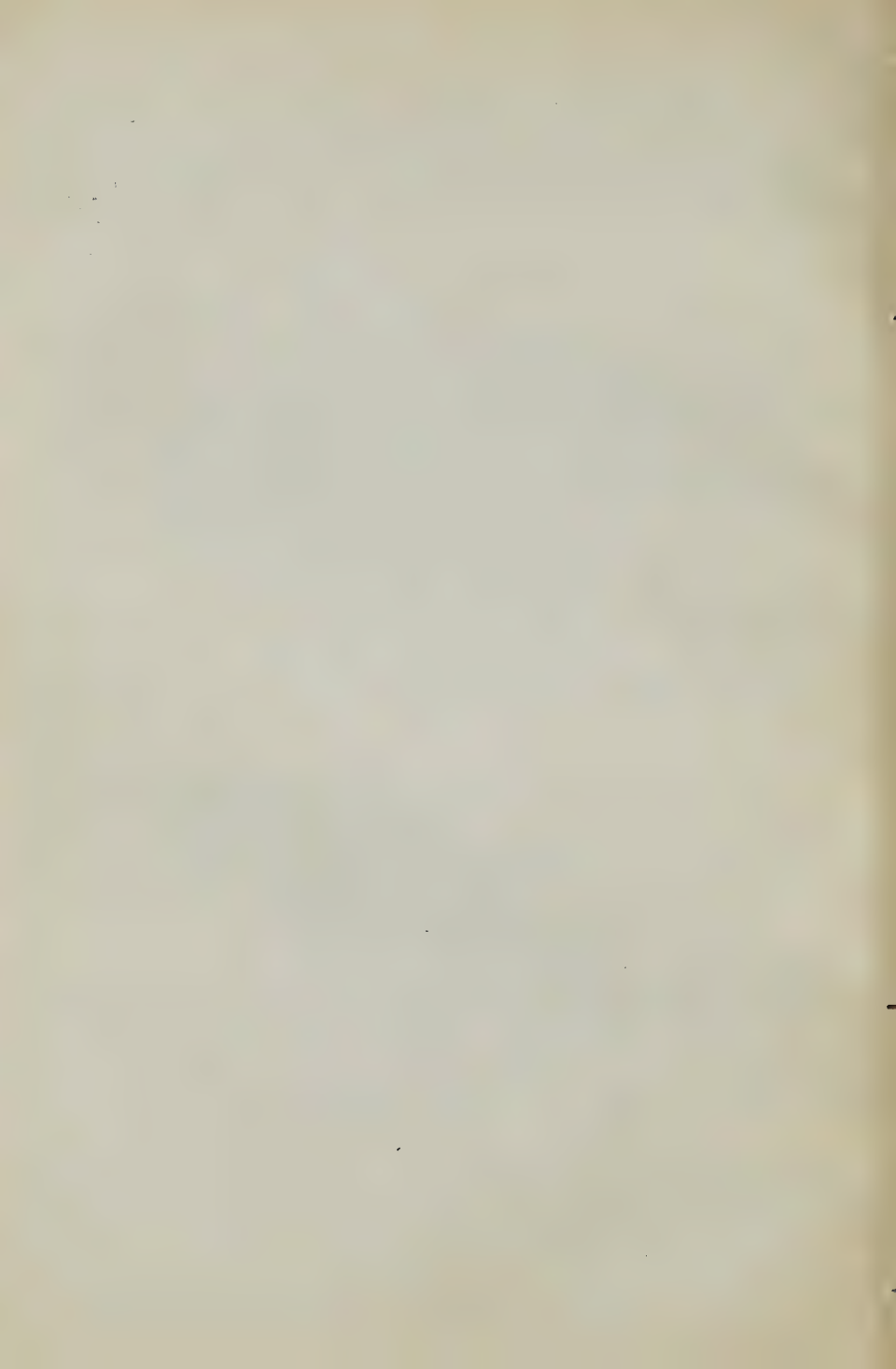
36.—Overhead Cover and Shelters

1. Overhead cover requires a large amount of material, which will often not be available, and takes a long time to construct. Its main advantage is that it enables the defenders of a trench to continue to use their rifles, even when exposed to a heavy shrapnel fire. Its importance will increase with the progress of aviation and the use of short range grenades and bombs, and its employment in some parts of the firing line may, therefore, be desirable.

2. Overhead cover to keep out splinters of shells, shrapnel bullets and hand grenades, should consist of about 9 to 12 inches of earth; or about 3 inches of shingle, supported on brushwood, boards, corrugated iron, or other materials.

3. In constructing splinter-proof shelters in the firing line it should be recollected that:—

- (a) the parapet must not be unduly weakened by them;
- (b) they must not curtail the number of rifles available;



(c) it must be possible to get in and out of them quickly;

(d) simple and numerous shelters are better than a few elaborate ones.

4. Various forms of splinter-proof shelter are shown on Plates 12, 13, 20 and 21. They all require a great deal of material. They should always be given transverse partitions to localize the effect of shell and be made weather-tight if possible. In firm soil it may be possible to burrow or tunnel shelters in reverse slopes which will suffice without additional materials.

5. In the case of closed works when artillery attack is expected from the front only, splinter-proof shelter for men allotted to the flank defences, may be given in trenches roughly parallel to the front faces. The trenches may be continued with advantage across the whole redoubt, for purposes of communication.

When the artillery attack may come from any direction, shelters for men not firing must be arranged to face in different directions, and parados must be constructed. (Pl. 12, Fig. 3; Pl. 19, Figs. 2 and 3; Pl. 20, Fig. 1.)

6. A roof proof against all except heavy howitzer shall can be made with two layers of rail parallel to the chief line of fire, failing to the rear at a slope of $\frac{1}{4}$ or steeper, and separated by 1 foot of earth, the top layer being covered with 2 feet of earth.

If timber only is available, the roof may consist of 12 inch logs, with 7 feet of earth above.

7. Where overhead cover is provided arrangements should, if possible, be made for extra rifles to fire over the top of the cover at night or upon emergency. (Pl. 13, Fig. 4.)

37.—Protected Look-outs and Observation Posts

In connection with all fire trenches protected look-outs should, if possible, be provided, which should be indistinguishable from the front. Well-made loop-holes may be sufficient for the purpose. (Pl. 13, Fig. 4.) Double reflecting mirrors, as provided under Musketry Regns., Pt. II. para. 185, may be usefully employed when obtainable.

Artillery and other commanders will also require observation posts from which to maintain a general control over the fire. Such posts will often be placed clear of all trenches and emplacements, wherever an extensive view is obtainable. The post for sentry group shown on Pl. 30, Fig. 2, can be readily adapted to such a purpose, or it may be necessary to provide raised observations. (Pl. 45, Fig. 1.).

38.—Dressing Stations

Some covered dressing stations should always be prepared in rear of the fire trenches. Each should be large enough to contain a plank table 6 ft. 6 in. x 2 ft. 6 in. with 2 ft. clear space all round. These stations should be placed near any cover trenches or splinter-proofs that may have been made in order that these may serve as waiting rooms for the wounded, otherwise the communication trenches are liable to become blocked. (Pl. 16 and 17.)

39.—Cover for Artillery

(See also F.S. Regs., Pt. I, Secs. 105 and 108.)

1. Cover from both fire and view may be obtained by a combination of natural and artificial cover. Thus the reverse slope of a ridge may be scarped, or pits may be sunk close to the front crest of a feature, but, unless artificial platforms are available, it is generally inadvisable to disturb the natural surface of the ground, as it does not cut up so readily as ground which has once been broken. It is better to take advantage of natural screens and to construct epaulments in rear of them.

2. If the ground is dry it may be watered or covered with raw hides to prevent the guns being located by the dust which would otherwise be thrown up on discharge.

3. The primary object is to supplement the cover afforded by the shield sufficiently to protect the detachments against oblique fire or against shell which strike the ground just short of the shield.

4. Diagrams of a gun pit and epaulment, suitable for shielded guns, are given on Pl. 14. **These types are given as a guide only**, and must be modified to suit the ground. For heavy guns, the epaulment should be constructed on the same principle as for field guns, but a parapet about 3 ft. high should extend round the front of the carriage.

The parapet should be constructed so as to provide ample interior space and a wide field of fire, and the gun should be run up as close to the parapet as possible.

Each field gun requires for its working a breadth of 13 ft. between the detachment trenches.

5. The original trace of the pit or epaulment should admit of improvement in the event of more time becoming available.

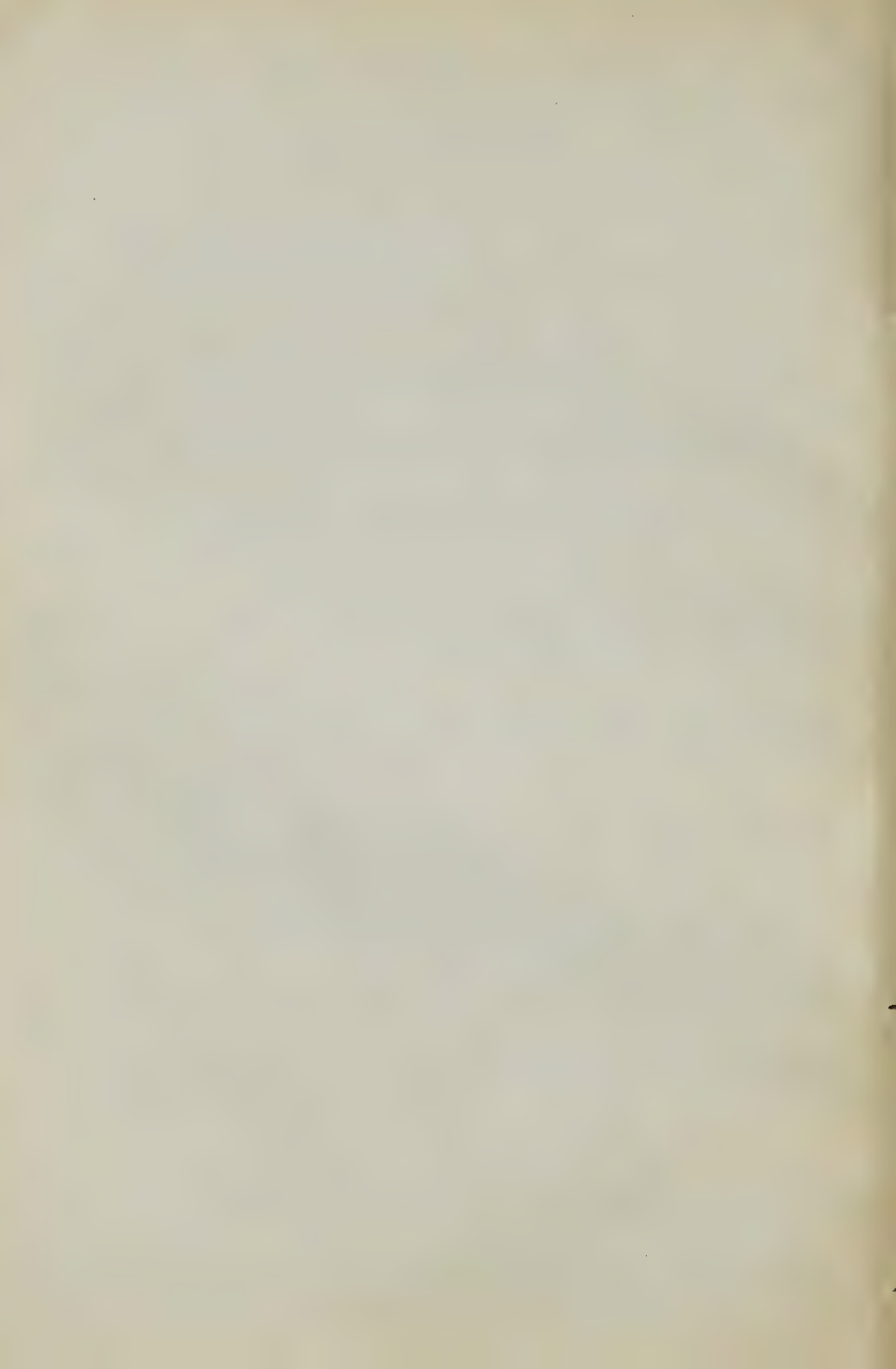
With more time the following should be added:

- i. Alternative emplacements.
- ii. Trenches to cover the detachment standing and recesses for ammunition.
- iii. Traverses against enfilade fire, and overhead cover against howitzer shrapnel bullets.
- iv. Cover for an unlimbered wagon near each gun with a covered approach for men replenishing ammunition; or some shelter pits for men bringing up ammunition from the wagon line.

40.—Cover for Machine Guns

(See also F.S. Regs., Pt. I, Secs. 7 and 109)

1. The value of machine guns largely depends on their being at hand when favourable opportunities for their employment occur. In the attack such positions will be gained almost entirely by a skilful use of the ground.



2. In the defence, on the other hand, concealed emplacements can be prepared in anticipation. These sites should usually be selected with a view to bringing a powerful enfilade or oblique fire on the attackers after they have reached effective infantry range, to flanking supporting works, and to sweeping any gaps that may have been left in the line of obstacles. (Plate 18.)

3. Machine guns can fire over a height of from $14\frac{1}{2}$ to 30 inches. In selecting a site for a machine gun emplacement particular attention should be paid to concealment. Provided the probable lines of advance of the enemy can be swept with fire, it will usually be preferable to select positions for machine guns away from salients, works, villages, etc., that may be held, so that they may be free to move about.

4. If the machine gun is to be located in a trench a platform of earth at the requisite depth can be left as the trench is being dug, or it can be built up subsequently. The crest of such an emplacement may take the form of the arc of a circle (Pl. 15, Fig. 3), the length of which will depend on the extent of ground it is desired to sweep with fire. Headcover should, if possible, be provided, but must not appear different from that constructed elsewhere in the trench, and the height and form of the openings through which the gun is to fire must be regulated by actual trial over the gun sights. The front of the emplacement may be undercut, to take the front legs of the tripod, should the nature of the soil permit. Two types of emplacement for a machine gun are shown on Pl. 15.

5. Splinter-proof shelter for the detachments should be provided close to the emplacements.

41.—Field Redoubts and Closed Groups of Trenches.

1. Field redoubts are works entirely enclosed by defensible parapets which give all-round rifle fire, and may be of any suitable command. This allround defence gives them greater resisting power against infantry than a group of trenches, and minimizes the danger of the infantry local penetration of a defence zone by the enemy, especially at night.

2. **Under ordinary conditions redoubts in defensive positions must not be designed or sited in such a way that they can be recognized as such by the enemy,** since this would probably lead to such a concentration of artillery fire on them as to neutralize their special value. This will prevent their employment in the main zone of defence as a general rule. If notwithstanding a redoubt is required in such a position its conspicuousness becomes a very important consideration. This will usually entail a command similar to that of the neighbouring fire trenches, combined, when time permits, with shelters in rear for the troops not actually engaged, an efficient obstacle, and the various auxiliary provisions requisite to render it self-contained and independent of adjacent works as regards capture by direct assault. Such an arrangement of fire trenches is shown on Plates 17 and 19.

In order to take its place in the main zone of defence such a group should, in addition, be planned so as to be elastic in its fire capacity while still remaining self-contained. It will thus be possible to vary the garrison of such a group.

either with a view to swelling the numbers in a general forward movement, or to correspond with the monetary fire value of that section of an entrenched zone in which it lies.

3. Redoubts may, also, often be employed as supporting points in rear. In such retired positions there will generally be sites which, while commanding a good field of fire, will not be visible from a distance.

4. For a work placed as a supporting point behind the front line, which is not visible from the attacker's artillery positions, the parapet may be higher. A high command has three advantages:—

- (1) It has a better command of its field of fire than a low redoubt.
- (2) It has a better moral effect on its defenders.
- (3) It conceals the interior of the redoubt from view.

The disadvantages lie in the extra labour and time entailed in making the parapet. A type of redoubt with high command is shown in Pl. 21.

5. Redoubts may be used for detached posts, and posts on lines of communication. Such works will often have to be a refuge and dépôt for passing troops, and room inside must be allowed for this purpose. It will hardly be possible to make these works invisible, as it is essential that the parapets should be high enough to allow the defenders to move about the interior without being seen. Being isolated and conspicuous, they may be liable to bombardment, and a large amount of splinter-proof shelter should be built. An all-round obstacle for protection against night attacks should be provided.

The site should be such that the immediate foreground may be well swept by the fire from the parapet, and the work should be so disposed as to give the strongest possible fire on the enemy's best lines of attack. There must be no dead ground at the angles.

6. The plan or trace of a redoubt or closed group will depend on—

- (a) Fire effect required from it.
- (b) Configuration of the ground.
- (c) Probable variation of garrison.

7. There is no necessity for symmetry in the design of a redoubt, although it has advantages. On a level site a rectangle with blunted angles is a suitable form to employ. Faces which make a considerable angle with their neighbours, as in a rectangle, should not be less than 20 yards in length, and the short faces which blunt the angles, should be at least 10 yards long in order to give room for an effective fire from them. For the same reason, curved faces, which it is often convenient to use, should be struck with a radius of not less than 20 yards. A complete circle should be avoided, except for very small posts, as its fire is weak in every direction. In the case of a closed group of fire trenches symmetry will, as a rule, be out of the question, and considerations (a) (b) (c) above will determine the trace.

8. The maximum garrison should always consist of one or more complete units. The rules laid down in F.S. Regs., Pt. I, Sec. 108 (8), for calculating the number of troops required for the defence of a position should be followed

when making estimates of the numbers required for the defence of a redoubt or group'

9. Since a redoubt is intended for all-round defence, precautions must be taken to prevent the defenders suffering from reverse fire.

10. The entrance to a redoubt used in civilized war may be a gap left in the face least exposed to attack, but under the close fire of the defence. The entrance should be wide enough to admit a wagon, *i. e.*, not less than 8 feet.

11. Good drainage of the redoubt and shelters must always be provided, and should be put in hand as soon as the work is commenced. Soak pits will seldom suffice for this purpose, and the drains should, if possible, be led out of the redoubt to lower ground.

12. When a redoubt or fire trench is to be occupied for more than a few hours, latrines and cooking-places and storage for water, accessible by covered communication, should be provided. (Pls. 16. 17 and 19, Fig., 1; and Pl. 20, Figs. 3 and 4.)

13. As redoubts are intended to withstand assault they should always be provided with obstacles, which should be placed where the fire of the defenders will cover them most effectively.

The nearer the obstacle is to the parapet the less elaborate need it be and the less labour and material will its construction demand; while its defence can be more effectively carried out, especially at night. For further details regarding obstacles, *see* Ch. VI.

(B) CLEARING FOREGROUND AND PROVIDING RANGE MARKS

IMPROVEMENT OF THE FIELD OF FIRE AND UTILIZATION OF EXISTING COVER.

Manual of Field Engineering Chap. IV

(See also F. S. Regs., Pt. I, Sec. 108, and Military Engineering, Pt. I, Sec. 10.)

**For tools available and estimates of time and labour required see tables
Appendices I and II.**

24.—General Instructions.

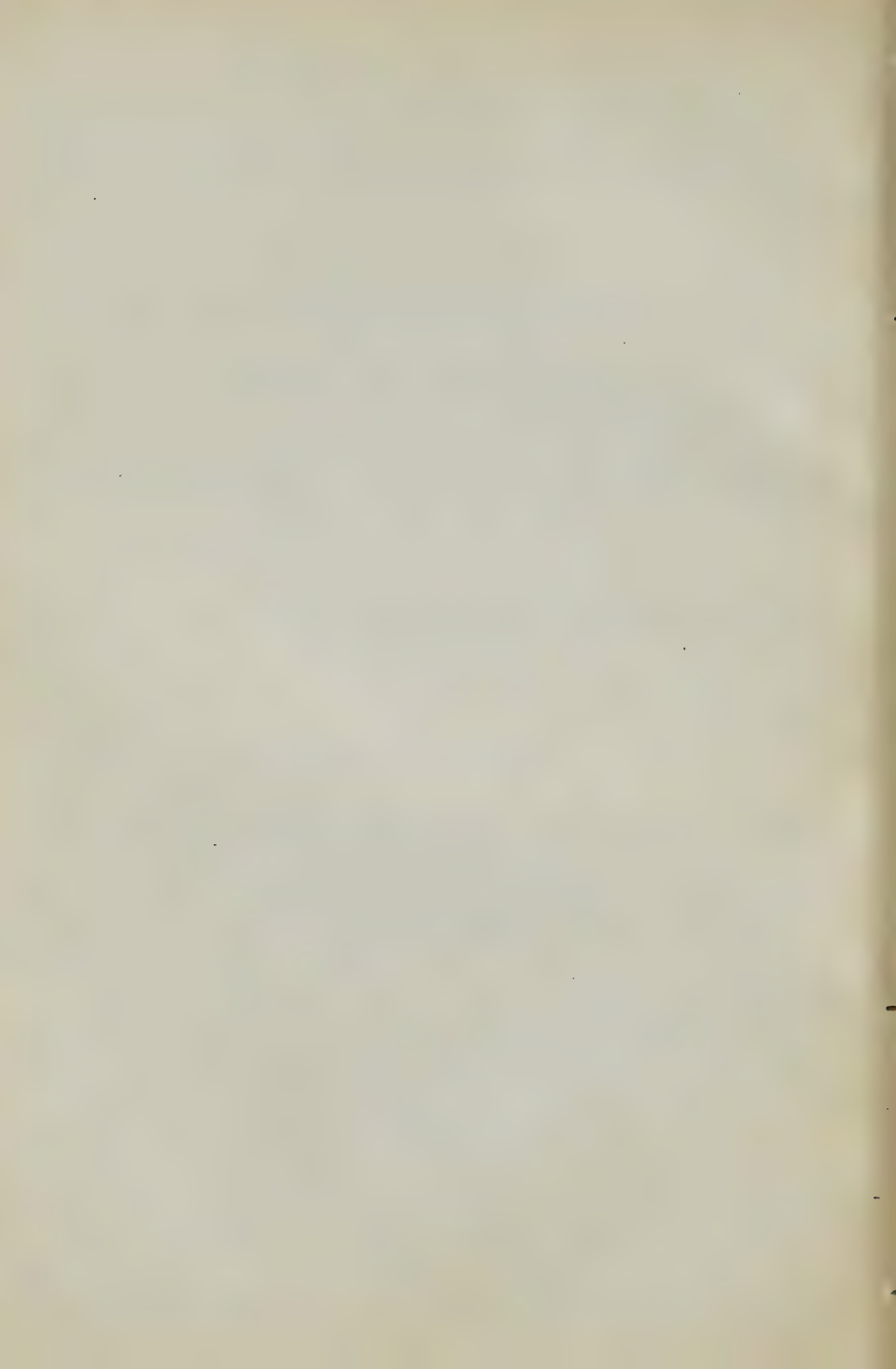
1. The provision of a good field of fire will usually entail some clearance of the ground in front of the firing line, but this must be done in such a way as to give no assistance to the attackers in their advance or in the use of their weapons. At the same time the possibility of adapting and improving any existing cover for the use of defenders should be borne in mind. Natural obstacles, which may be left, should be such as not to interfere with counter attack or screen the enemy from fire.

2. It will be advisable first to improve the field of fire near the position and work forward as time permits; but, in case of a delaying action where fire effect at long ranges is required, it may be better to prepare for bringing fire to bear upon points at some distance from the position.

Hollows and unseen ground, which would give the attackers shelter at points dangerously near the position, may be filled up with abatis, or débris of walls, &c., and should be fenced off if possible.

Large scattered trees give less cover when standing than if cut down, and may sometimes be useful as range marks.

Range marks should be provided and should be placed on that side of large trees, houses, banks, &c., which is only visible to the defence. The simplest arrangement consists of one white object per 100 yards range. 500 yards may be denoted by the sign **V**, made with two boards, poles, &c., and



1,000 yards by the sign X. Intermediate hundreds being indicated by single objects in addition, as above described.

Every soldier should in addition know the ranges to points under fire from his post, which are likely to be traversed by the enemy. These points should not be selected merely because they are prominent.

3. Cover may be classed as cover from view, cover from fire, or a combination of both.

The chief uses of cover from view are to screen movements from the enemy's observation, with the object of effecting a surprise, and to enable supports and reserves to be moved as required with a minimum of loss.

When clearing the foreground of a defensive position, the question of leaving screens for this purpose should be constantly kept in mind. In a close country much can be done towards attaining this object by judicious thinking, or by leaving trees, hedgerows, or even portions of copses standing. Where no natural screens exist they may sometimes be improvised.

In utilizing existing cover to give protection from fire the essential point to bear in mind is that the soldier shall be able to use his rifle to the best advantage.

Cover, whether from view or fire, should not provide a good mark for the enemy's fire. The edges of woods, hedges and banks, which are clearly defined and run parallel to the enemy's fire position, prominent trees and other land marks, all present favourable objects on which to range. but the provision of alternative cover would often take longer to construct and be still more conspicuous.

4. Smoke may sometimes be employed to give cover for working parties. especially against searchlights. Sacks filled rather tightly with straw, left open at each end and slit to allow the escape of the smoke, form simple and portable smoke producers. They should be lit in the centre of the straw, so as to burn outwards.

5. Thick brushwood, especially in case of some tropical growths, forms a very effective obstacle, which should only be cleared away in accordance with the principles laid down above. Thus, in place of making a complete clearance, portions may with advantage be left untouched, either to deny special points to the attackers and break up their attack, or to compel the adoption of particular lines of advance. The portions cut down may often be formed into an obstacle among the parts left standing.

25.—Hedges.

1. Hedges and banks which interfere with the defenders' fire or screen the attack, must be removed so far as time will permit. The clearance of hedges perpendicular to the front is of less importance than of those parallel to it.

2. Ordinary hedges are principally valuable for the concealment they afford. Unless they are very thick, wire and stakes must be added to render them efficient obstacles.

3. Where there is a ditch on the defenders' side, it can usually be con-

verted into a useful fire trench with little work. (Pl. 7, Fig. 4.) If there is no ditch on the defenders' side, a trench should be dug and the earth thrown up against the edge, if command is necessary, but the edge must be strong enough to support the earth and thick enough to prevent its showing through on the side nearest the enemy. (Pl. 7, Fig. 5.) The time required to excavate such trenches will usually be longer than that required for ordinary trenches on account of roots, and at first work must be concentrated only at the points to be occupied by each rifle-man.

26.—Embankments and cuttings.

1. Embankments are not, as a rule, good positions for a firing line exposed to artillery fire, as they offer opportunities for accurate ranging; they must however, often be held in order to bring fire to bear on what would otherwise be dead ground. They can be defended by occupying the rear side, as in Pl. 7, Fig. 1, or the front side, as in Fig. 2, or better still by a combination of both methods. The front side gives a better view of the ground, but cover can be obtained with less labour at the rear side.

2. Cuttings can be defended in a similar manner (Fig. 3). The rear side gives the best opportunity for concealing an obstacle; the front side is better for a subsequent advance, and secures good shelter for supports. Generally speaking fire trenches should be sited on the front side of cuttings at re-entering angles and on the rear side at salient angles, not necessarily on the actual edge of the cutting.

3. A road cut on the side of a hill will generally be visible to the artillery of the attack at long range, and should not therefore be held unless it offers special facilities for defence, or is artificially masked.

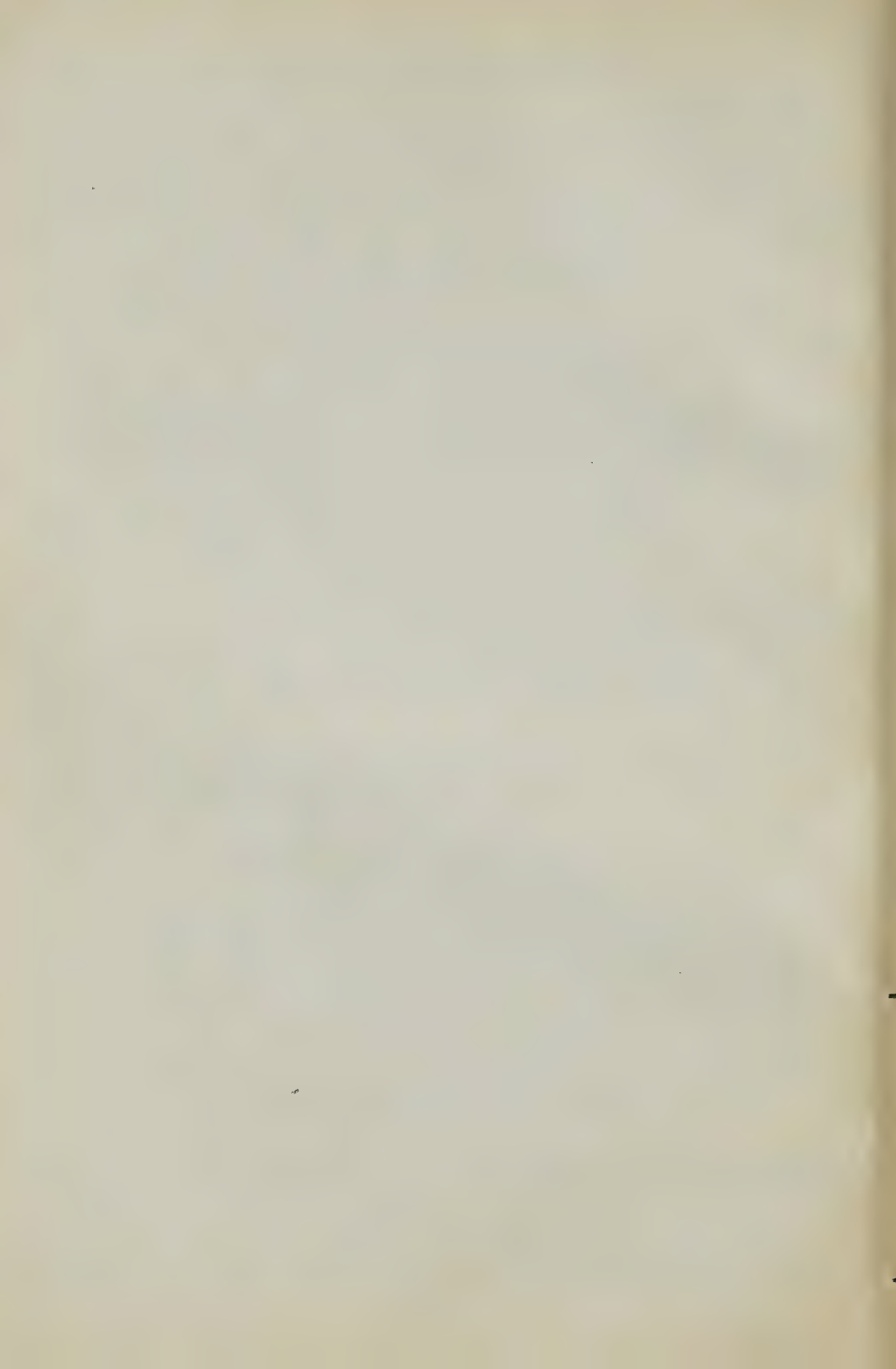
27.—Walls.

1. Walls can be knocked down by using picks, crowbars, and hammers; or a short length of rail slung from the pole of a timber, &c. Lightly constructed buildings may be similarly treated. If solidly built they must be blown down and the ruins levelled, as far as possible, so as not to give cover,

2. To give protection against rifle fire a wall must be well built and at least 9 inches thick. Walls should not be held under effective artillery fire, but may be utilized for defence after artillery fire has ceased. If it is desired to make use of a low wall and time is available, it should be used as a revetment, and a parapet thrown up against it.

A wall between 4 feet and 4 feet 6 inches high can be used as it stands. If a wall is less than 4 feet high a small trench should be sunk in the inside to gain additional cover. (Pl. 8, Fig. 1.)

Between 5 feet and 6 feet in height, a wall can be notched; but, above 6 feet in height, a stage is necessary to enable men to fire over the wall, or through notches (Pl. 8, Figs. 2 and 3); or else the wall must be loopholed (Pl. 8, Figs. 4 and 5.)



3. Loopholes, which are preferable to notches owing to the better head-cover they give, should not be closer together than 3 feet from centre to centre and need not be spaced symmetrically. The opening can be made by means of crowbars or picks if a mason's chisel cannot be obtained, and should be as small as possible on the outside to lessen the chance of bullets entering. A rifle held in the required position will give the form and height of the loopholes. A normal type is illustrated in Pl. 10, Figs. 3 to 5.

4. Where long lines of walls have to be manned, flanking fire should, if possible, be provided from bullet-proof projections in front of the wall.

Care must be taken to avoid putting trenches unprovided with overhead cover so close in front of masonry walls that ricochet bullets or splinters of shells are liable to strike the occupants of the trenches.

5. The tops of walls, prepared for firing over, should be covered with a layer of turf to check splinters and provide a good rest for the rifle.

6. When a wall has been deliberately loopholed for fire as many dummy loopholes, or marks, as possible may be added to the exposed side, in order to multiply targets at close range. (**See also** Section 31 (4).).

The preparation of the position for Defence.

1. *T. Cap. 11.—Infantry in Defence, Section 129.*

See commencement of "II Defence".

(C) OBSTACLES

OBSTACLES

Manual of Field Engineering, Chap. VI

(**See also** Military Engineering, Pt. I, Sec.II.)

For table of time, men, and tools required, see Appendix II.

42.—General Instructions

1. **Obstacles are used to obtain a definitive control, both as regards direction and speed, over the progress of troops advancing to the attack. Their chief value lies in their power to deflect the attacking troops into areas most favourable for their destruction by the defenders.** With this object in view they should be arranged

- (1) to break up the unity of action and cohesion of the attacking troops,
- (2) to deflect the parties thus isolated into the best swept fields of fire, and

- (3) to arrest them under the close fire of the defenders. They are especially useful against night attacks.

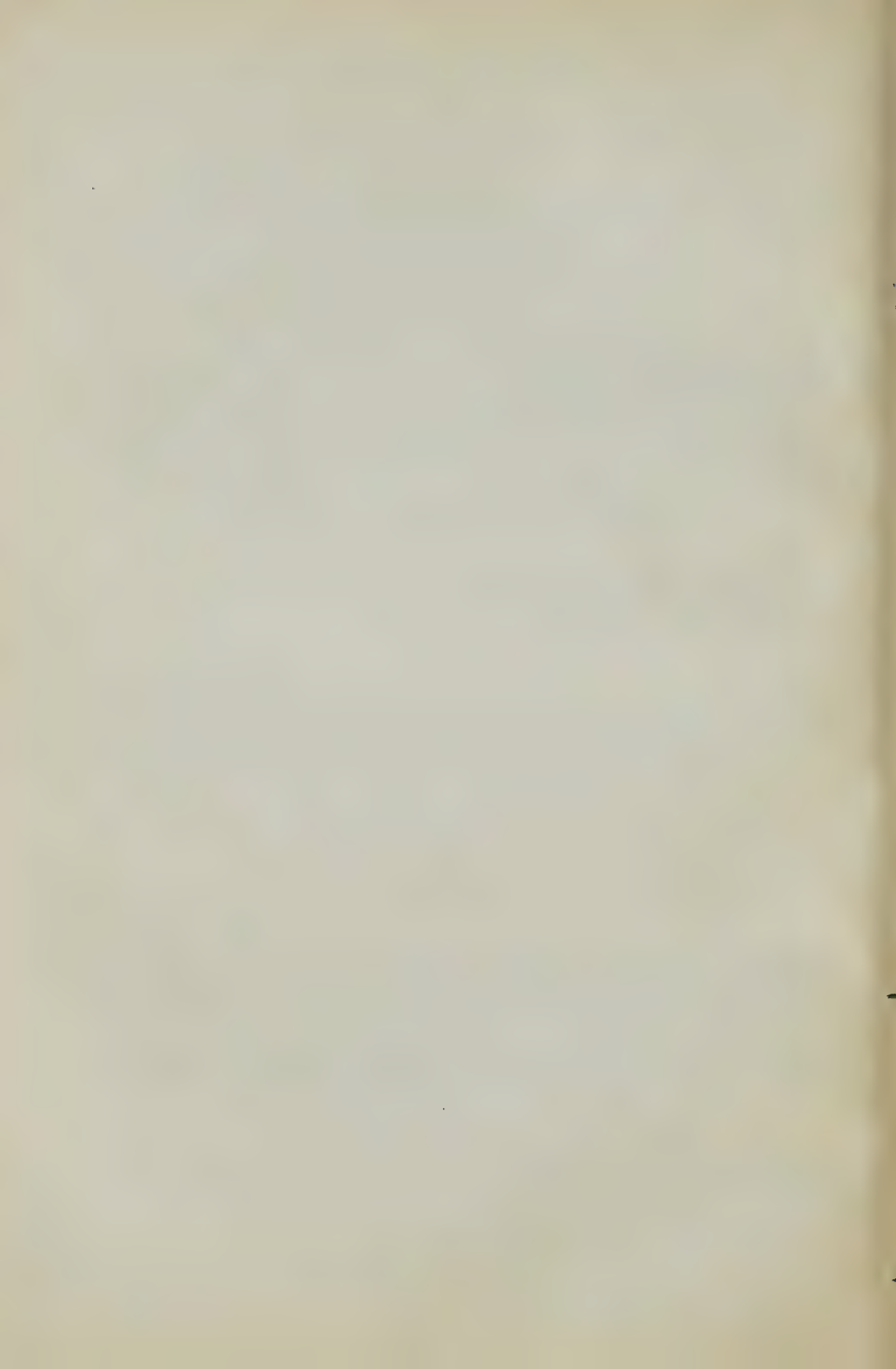
2. For the first two purposes indicated above, the obstacles may be at any distance from the defence, but, if they are not under fire from the position, much time and labour will be needed in order that they may effect their object.

For the last purpose, they should fulfil the following conditions:—

- (a) They should be under the close rifle fire of the defenders, the outer edge not more than about 100 yards from the parapet. For small posts or redoubts they should be **quite close**, so that they may be effectively defended at night; but, if they are much less than the distance given above, it will be possible to throw hand grenades into the work. They should be as wide as time and material will allow, should afford the enemy no cover, and should, if possible, be sheltered from his artillery fire. Their actual position will generally be determined by placing them where they can be covered by the most effective fire of the defenders.
- (b) They should be difficult to remove or surmount, and will be most effective if special appliances, not usually carried by troops, are required for their removal. Special attention should be paid to the security of their anchorages.
- (c) They should, if possible, be so placed that their exact position and nature are unknown to the attacking force; with this object their sites may be sunk. It must also be remembered that conspicuously placed obstacles may betray the existence of an otherwise well concealed position.
- (d) They should be arranged so as not to impede counter attacks.
- (e) They should not be constructed without authority from the officer commanding the section of the defence, otherwise they may interfere with an advance.
- (f) They should not be continuous, but should be constructed in sections. Occasional gaps in the line will often lead the attackers to crowd in towards them. Such passages may be provided with land mines, and must be covered by gun and rifle fire. Roads passing through obstacles, and occasionally required for use by the defence, should be closed by portable obstacles, such as chevaux de frise, when not required for traffic.

3. The greatest length of obstacle which can be controlled by one man on a stormy and dark night is about 35 yards on either side. Where the total length of obstacles exceeds 70 yards, additional sentries, systematic patrolling or efficient mechanical alarm signals (which will act upon interference not amounting to the severing of a wire) must be provided in order that the defence may reap the full benefit which an obstacle should confer.

4. The provision of obstacles, flares, and mechanical signals is under no



circumstances to be accepted as a substitute for the efficient performance of the duties of a sentry as laid down in F. S. Regns., Pt. I, Section 81.

43.—Abatis

1. The construction of abatis can seldom be attempted unless suitable material grows close at hand. Abatis formed of limbs of trees firmly picketed down with the branches pointed and turned towards the enemy form a very efficient obstacle. Strands of wire interlaced between the branches add still further to their efficiency.

2. In civilized warfare where bush or jungle abounds abatis of thorn bushes form an efficient obstacle. It should be made about 4 feet high and not less than 15 ft. wide.

3. Tree entanglements are formed by cutting trees, brushwood, &c., nearly through at a height of about 3 feet, and securing the branches by pickets to the ground. They can often be constructed whilst clearing the foreground, and may be suitably employed at the edges of woods and orchards or for blocking roads.

4. Timber which is felled within close rifle range should usually be cut off breast high so that the stumps may be available for wire entanglements.

44.—Wire Obstacles

1. A low wire entanglement can sometimes be usefully employed in undergrowth. It can be made by driving pickets into the ground, so as to leave 12 or 18 inches projecting. The tops of these pickets are then joined to one another with wire.

2. High wire entanglement forms a very effective obstacle. It should be as wide as time and material will allow, but the width need not be uniform. It should be greatest where the fire of defence is least effective. It will be more difficult to remove if it is constructed in two zones with a small space between the parts.

3. The stouter the posts that are used, the better; but, if they are very large, it will be difficult to drive them into the ground, while their stability suffers if holes have to be dug for them. They should average 4 to 5 inches in diameter, and 5 to 8 feet in length.

4. The outside posts must be well stayed, especially those nearest the defenders, and, to render the passage of the obstacle by means of hurdles, planks, etc., more difficult, the posts should be driven in at irregular intervals (5 to 8 feet), and to varying heights (average 4 feet). With the same object, large nails may be driven into the heads of the posts.

5. Each post should be joined with taut wire, head to foot and foot to head, to all the adjoining ones.

The wire should be wound round the posts and secured by staples, which may be made of the wire itself. Barbed wire should then be hung in festoons between the posts, but on no fixed pattern, and fastened to the posts by short lengths of wire.

6. Pl. 22, Figs. 1 and 2, show the principles of construction of a high wire entanglement, while Fig. 3 shows a method of improving a wire fence into a fair obstacle.

7. It is essential to the efficiency of the obstacle that it should be impossible to crawl under it without the use of cutting tools.

8. To ensure something being done at once and throughout, it may be advisable to order the construction of a fence of so many strands between the selected points which will form a nucleus for the finished obstacle.

9. Trip wires may be put in front of likely points of attack. They should be in lengths of about 10 yards, fastened at each end to a stout peg, hammered flush with the ground. The wire should be quite loose, and should be tightly coiled up before use so that it may be curly when placed in position.

45.—Barricades.

1. Barricades to close streets, roads and bridges, can be made of almost any materials. They should not, as a rule, completely close the road to traffic, but should be made in two overlapping portions, or be placed where a house standing back from the general line of building allows a passage round them.

2. If the defenders are to fire over them, they should be bullet proof, and, if placed in a street, they should be flanked front and rear by fire from adjacent houses. (Pl. 24, Fig. 2.) For firing four ways they should be arranged as shown in Pl. 25, Fig. 3.

46.—Mines.

1. Fougasses and land mines have great moral, and sometimes material, effect on the attackers, but are difficult to construct and should only be laid by officers who have a thorough knowledge of explosives (see Military Engineering, —Part. IV).

47.—Inundations

1. Inundations can be made by damming up a stream. A bridge is a good place to select for the purpose. If the dam is made of earth either loose or in sacks, it is essential that a waste weir or overflow, cut in the solid ground clear of one end of the dam, should be provided, or the destruction of the dam will rapidly follow its completion. An earth dam must have a gentle slope, not steeper than 1-3, next the water.

2. If the inundation is likely to be shallow, the ground should be first prepared by digging irregular trenches and holes, or one regular trench which will make the water too deep for wading, and by the construction of wire entanglements; this will render the passage of even a very shallow inundation a difficult matter.

48.—Passage of Obstacles

1. Obstacles such as wire entanglements suffer very little from artillery fire or from explosives thrown indiscriminately into them. All obstacles may be

passed by the bridging over, cutting through, or tunnelling under, but the operation must, as a rule, be a surprise, and should generally be carried out in darkness. Whatever plan is adopted it must be capable of being carried out rapidly and silently, must be free from complicated manœuvres, and must be preceded by a very careful reconnaissance of the actual sites selected for passage.

2. The following are some of the methods that may be employed for passing wire entanglements:—

(i) By climbing over the entanglement on specially prepared ways.

These may be from 9 feet to 10 feet long and from 2 feet to 3 feet 6 inches broad, made of light battens nailed to longitudinals (say 1 1-2 in. by 5 in.) with rounded ends and bottoms. These frames may be placed in position by up-ending or sliding them along the wires; or, if connected by flexible joints (rope), they may be carried folded up and unfolded on the top of the entanglement. Planks, hurdles or ladders may be used in a similar manner, but a narrow gangway is easily capsized.

(ii) By clearing a passage through the entanglement:—

(a) By the deliberate application of explosives. One way of doing this is to lash a charge on to a long pole, or to fill canvas hose, etc., with it and push it along the ground under the wires. If the depth of entanglement is too wide for one pole the number must be increased, and they must be placed in position by men crawling along under the wires. Care must be taken that the charges on the different poles overlap so as to ensure the continuity of the whole. Two pounds per foot run of width should clear a passage of from 10 to 15 feet wide, but this result is not always attained. The objections to this method are the excessive quantity of explosive required, the difficulty of placing such a charge, and the fact that when the charge explodes all chance of a surprise is at an end.

(b) By cutting the wires. This would be done by men creeping up the entanglement and cutting the wires. To prevent noise when a wire is cut a man should hold the wire on either side of the cutter.

(c) By using grapnels to pull a piece of the entanglement away. Grapnels of steel of about 3-4 inch diameter should be used, with 3 or 4 short prongs and an eye at the end to take a wire rope. They should not exceed 4 lbs, in weight, as otherwise they are too heavy to throw. When they have caught in the entanglement, the latter would be dragged away bodily by men hauling on the rope. This method would usually be combined with (b).

3. For the passage of obstacles requiring the further application of bridging or explosives, **see** Chapters XIII and XIV, and for mining or tunnelling underground, **see** Military Engineering, Part. IV.

49.—Wires and Leads.

In dealing with wires which may be connected to alarm signals, mines, etc. care should be taken not to vary their tension during or after their severance. If the wires are supported by staples the latter should be driven tight home into the posts on either side before making a cut, and the severed ends carefully twisted round the posts to maintain the tension.

If the wires are covered with insulating material, the cut ends should not be allowed to touch other bare wires or the earth, but should be carefully supported in the air as far apart as possible.

I. T. Cap. 11.—Infantry in Defence.—Section 129. subsection 5.

See commencement II Defence.

(D) DISTRIBUTION OF TROOPS TO HOLD A POSITION

I. T. Sections 128 & 132

See commencement II Defence.

II—DEFENCE—I. ACTIVE DEFENCE**(E) DEFENSE OF LOCALITIES****DEFENCE OF LOCALITIES AND POSITIONS.**

Manual of Field Engineering, Chap. VII

50.—Defence of an Extended Position.

(See also F. S. Regs., Pt. I, Sec. 108.)

1. Every endeavour must be made to follow the principles for an active defence given in the Field Service Regulations, and especially in Pt. I, Section 108 (2), where it is provided that “**Though the extent of ground ac-**

tually held, when the direction of the enemy's advance is definitely known, must be strictly limited by the numbers available, the extent of ground reconnoitred and prepared for occupation may be much larger, and should admit of various alternative distributions of the force to meet the various courses of action open to the enemy."

The preparation of alternative firing points, and improvements to communications should therefore usually take precedence of other work as soon as the main tactical points have received that amount of attention which the commander of an entrenched zone may consider reasonably sufficient.

2. The object with which a position is occupied as well as the time likely to be available for its preparation will usually determine the works to be undertaken, but, as no position can ever be too strong, additions and improvements should continue to be made up to the last moment. Such improvements are not to be confined to the provision of better cover from fire for the defenders. Special consideration must be given to the means by which the artillery will co-operate with the infantry.

3. In practically all positions there will be localities of special tactical importance. It is on localities of this nature that the principal efforts of the defender should be concentrated in order that they may form pivots on which to hinge the defence of the rest of the position. They may be commanding features of the ground, groups of substantial buildings and enclosures, or wooded knolls giving cover from view and a good field of fire to front flanks.

It is essential that such pivots should be capable of all-round defence, and that each should be able to sweep with fire a large proportion of the ground lying between it and those on either side.

If the pivots are strongly held and fortified, the number of troops necessary for the defence of the intervening ground need not be large, and the defence works themselves may be limited to ensuring that ground invisible to the defenders of the pivot group is swept by fire.

A position, defended on these principles, lends itself to those local offensive movements which are so effective in keeping alive an offensive spirit in the defenders, in wearing down the attacker's powers, and in facilitating the delivery of a decisive counter attack.

4. The position, if extensive, should be divided into sections to each of which a name and number and a distinct unit or formation should be assigned (see also F. S. Regs., Pt. I, Sec. 108). Definite portions of such formations should be detailed as garrisons to each of the localities referred to above, in the defence of which every artifice of field fortifications should be brought into play. It is in the preparation of these pivots that field engineers should generally be employed.

Within each section the commander may organize sub-sections describing them in any manner best calculated to assist the troops. Example:—No. II (North East) Section, C sub-section (Green Farm).

5. The principal defences will, as a rule, consist of fire trenches which may be disposed in irregular lines or in groups with intervals, according to the character of the ground.

If the position consists of a succession of spurs and re-entrants, it may often be possible to draw back the trenches on the spurs, so that they are invisible from the foot of the spur on which they are placed. The fire from such trenches should be arranged so as to sweep obliquely the front of the spurs on either side, while a trench placed at the head of the valleys which divide them provides the necessary fire for searching the re-entrants. (Pl. 18.)

In tracing trenches which are to provide flanking fire, steps must be taken to protect them against enfilade fire, especially from artillery at long range.

To increase the volume of the defenders' fire, tiers of trenches may sometimes be employed: while in other parts of the position trenches for companies or smaller units may be arranged in *échelon* which will make it difficult for the attacker's artillery to keep more than a small portion of the defenders under fire. There must, however, be no idea of using trenches, arranged in depth, as successive lines of defence. This must be clearly understood by the defenders of all trenches constituting the main zone of defence, which should be held to the last.

7. Careful arrangements are necessary to prevent the extreme flanks of an entrenched zone which do not rest on an impassable obstacle being quickly turned.

Such flanks should be gradually refused in *échelon* until some suitable supporting pivot is reached. They should not be turned back obliquely to the main front, as this exposes them to enfilade fire and does not seriously increase the circuit of a turning movement.

The allotment of a mobile force to the flanks in addition to such defences is a question which the superior commander must decide on the spot.

8. To facilitate inter-communication throughout the position, trenches, shelters, cross roads, etc., etc., should be provided with sign boards showing the nature of the place, the allotment of troops, etc., By night lanterns, extemporized from oblong wooden boxes, one side of which is covered with semi-transparent paper on which directions can be written, may be used for the same purpose. Arrangements should be made for visual signalling between adjacent fire trenches, and between the fire trenches and commanders of groups.

Telephones should be freely used when available. (See also F. S. R., Pt. I, Sec. 86.)

9. With a view to misleading the attackers as to the situation and extent of the main position, and thus creating favourable opportunities for the defenders to manœuvre against them, an **advanced position** may be occupied. Such a position should be distinct from the main defensive position, and may consist of groups of trenches and artificially strengthened tactical points. Special instructions as to the amount of resistance to be offered, and as to the direction in which they are to retire, must be given to the troops occupying this advanced position.

10. A clear distinction must be drawn between the occupation of an advanced position and of advanced posts. The latter are localities which are occupied in order to deny ground to the enemy and not

merely as a screen to the main position. If they can be effectively supported by fire from the main position, they may be of value in breaking up an attack; but the fact that they form salients against which the enemy may be able to bring a heavy converging fire must be given due consideration when coming to a decision. (See F. S. Regs., Pt. I, Sec. 108.)

11. The general duties of the commander of a group or posts in an entrenched zone are those laid down in F. S. Regs., Pt. I, Sec. 78, for a commander of outposts

During the construction of the entrenchments he should study his surroundings so as to obtain information as to the strong and weak lines of fire, the points from which fire can best be controlled, and communication with other posts arranged. Where practicable, he should examine the position from the attacker's point of view.

He should prepare a sketch of his command on as large a scale as possible, showing the general arrangements of the works, obstacles, kitchens, latrines, etc., the ranges to various range-marks, and the points from which adjacent works can be supported.

This sketch, together with any other information such as work still to be carried out, special arrangements by night, and points where the enemy has been observed, must be handed over on each transfer of command.

51.—Use of villages in Defence.

(See also Military Engineering, Pt. I, Sec. 15.)

1. If it is decided to occupy a village, either in the main zone of a defensive position or as a supporting point in rear, every effort should be made to organize an obstinate defence. Such places, strongly held, not only assist in breaking up the attack, but may be of great assistance in driving out the enemy, should he succeed in penetrating the position. It will, as a rule, be advisable to regard a village as a section of a position, and in no case should the main highway through a village form a boundary between adjacent sections of defence. The superior commander will decide whether a village situated in a position, is to be occupied or not.

2. The suitability of a village for defence depends on:—

(a) The nature of its surroundings.

(b) The extent and shape of the village itself.

As regards the latter point, villages lying end-on to the enemy can often be made strong against flank attack, and may, therefore, be useful on the flanks of a position.

3. For the defence of a village, a definite garrison should be detailed under the command of a selected officer. The latter will be responsible for selecting the main and any interior lines of defence, for dividing the village into sub-sections, for allotting to each a proportion of the garrison, for arranging for a central hospital for wounded men, and for notifying the position of his headquarters. A general reserve should be retained in the hands of the com-

mander to deliver counter attacks against any of the enemy's troops who may succeed in entering the village and to man the keep if one is prepared.

4. Each subordinate commander should consider the preparations for the defence of his sub-section in the following order:—

- (i) Improvement of the field of fire.
- (ii) Provision of cover and preparation of buildings for defence, much of which may be done concurrently with (i).
- (iii) Provision and improvement of communications.
- (iv) Provision of obstacles and barricades.
- (v) Arrangements for extinguishing fires.
- (vi) Ammunition supply.
- (vii) Food and water.
- (viii) Removal of sick and wounded.
- (ix) Retrenchment.

5. The firing line should usually be entrenched in front of any buildings to prevent casualties from shells which burst against their walls, and arrange to bring a powerful volume of fire on the best lines of attack

6. Guns and machine guns should not, as a rule, be located amongst buildings, as there is considerable risk of their being discovered in such a position, in which case they are likely to become the object of concentrated hostile fire. Concealed positions in rear and to a flank should preferably be selected from which to flank a village and bring a cross fire on the enemy's probable lines of approach, and from which they can be more easily moved in accordance with the progress of the battle.

7. If, as is often the case, important bridges are located within the village definite instructions as to their value to the commander should be obtained before defence preparations are commenced.

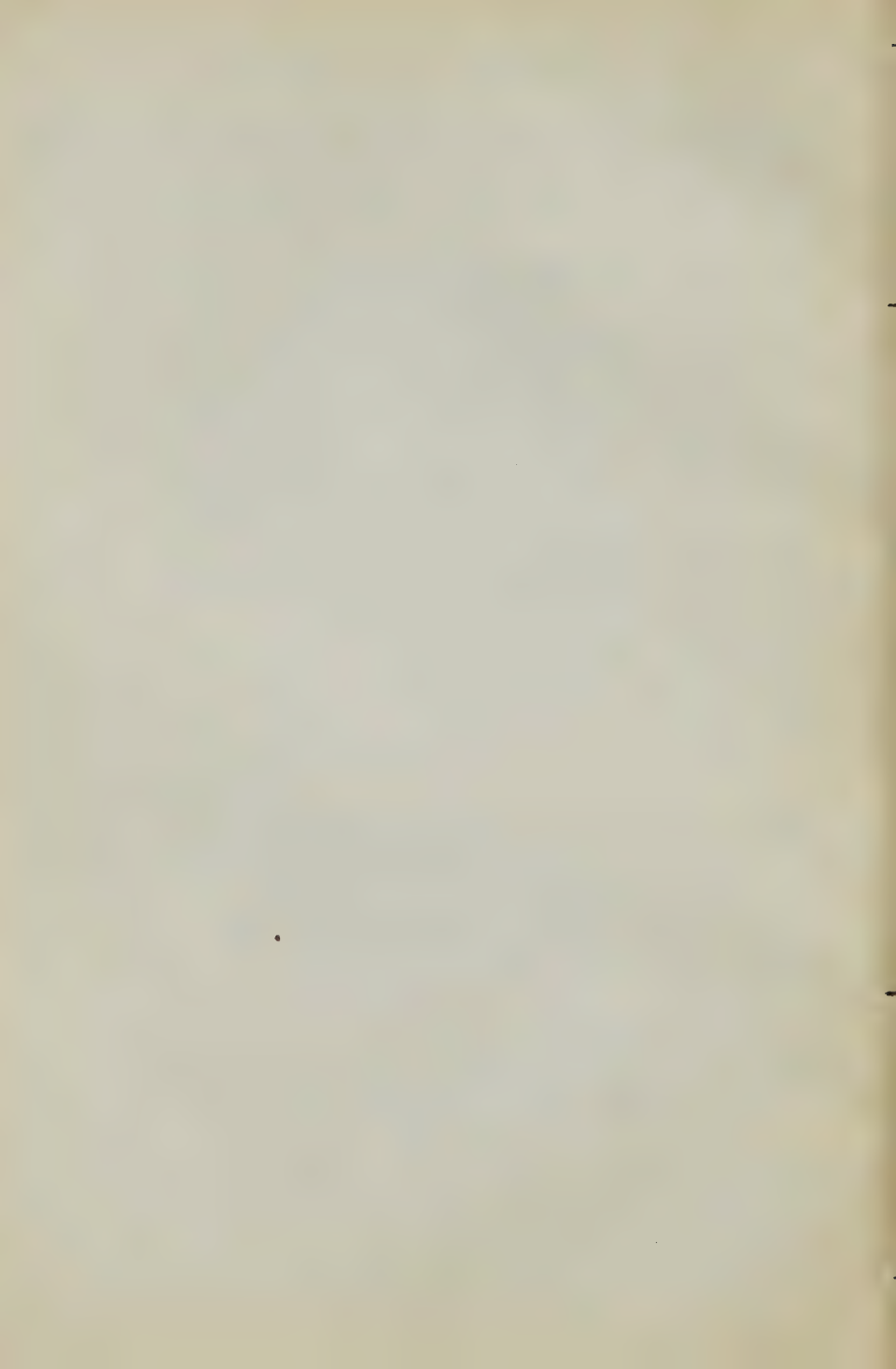
52.—Use of buildings in defence.

(See also Military Engineering, Pt. I, Sec. 14.)

1. Buildings, when not exposed to artillery fire, may be of great defensive value. They should not be held when actually under artillery fire as they afford a conspicuous mark, and the danger from flying debris caused by shells is considerable; but, if time and labour are available, they should be prepared for defence, and occupied when the artillery fire ceases.

2. The principles laid down in Section 1 and 27 are applicable to the defence of buildings, but the following additional points also require attention:—

- (i) Bullet-proof barricades to doors and windows. The means of exit, not necessarily on the ground floor, must be dealt with in a special way. It is easier to make loopholes in the barricades (Pl. 23) rather than to attempt to loophole the walls.



- (ii) Arrangements for ventilation, for the storage of ammunition, provisions and water, for a hospital and for latrines.
- (iii) Arrangements for extinguishing fires.
- (iv) Destruction of any outlying buildings which are not to be occupied, bearing in mind the importance of leaving no adjacent cover where an enemy might collect for assault.

3. If the building is large and strongly built, and it is intended to make an obstinate defence, arrangements must be made for interior defence by loopholing partition walls and upper floors made bullet proof and strengthened if necessary to sustain the extra weight. Material with which to improvise additional cover or movable barricades to cover the retreat from one part of the building to the other, or from one building to another, must also be provided.

53.—Use of Woods in Defence.

(See also Military Engineering, Pt. I, Sec. 16.)

1. Woods vary so much in character that it is impossible to give instructions for their use in defence which shall be suitable in all cases.

The two attributes common to most woods are the obstruction they offer to the passage of troops, whether in defence or attack, and the concealment they provide. As to the obstacle, it is the defender's business to arrange that it shall cause the least inconvenience to his own, and the greatest inconvenience to the enemy's troops. The concealment afforded should be so utilized as to be almost entirely in favour of the defence.

Special precautions are necessary for the defence of woods which run down from a position towards the enemy, since they make co-operation between the artillery and infantry of the defence almost impossible and afford the enemy a covered line of approach.

2. In the case of large woods the difficulty of controlling troops engaged in them, the liability of those troops to lose their way, and the rapid consumption of reserves, make the improvement of their communications one of the first considerations.

If time is limited it will generally be best to devote it to improving the communications rather than to multiply obstacles. For infantry several parallel tracks cleared of undergrowth are of more value and take less time to make than one broad road.

3. The front edge of a wood often has a boundary capable of being quickly made into a good fire position, but usually offers a good mark for artillery fire; for this reason it may be desirable to place the firing line some 200 yards in advance, this being about the maximum distance short of the wood at which shrapnel should be burst, in order to be effective.

If by clearing the undergrowth a good field of fire can be obtained between the tree trunks, the firing line may sometimes be placed with advantage 25 to 50 yards within the woods. In order to economize troops, those portions of

the front from which effective fire can be developed, should alone be occupied by the firing line, the remainder being entangled.

4. Where roads, rides or clearings exist in a wood the rear edge may be organized as a second line of defence. Such positions have often proved sufficient to stop the advance of troops who have succeeded in penetrating the front.

On the other hand, entrenchments and clearances on a large scale in the interior of a wood will seldom repay the time and labour necessary for their construction.

5. If defences in rear of a wood are more convenient than in front, the best arrangement will be to straighten and entangle the flanks and rear edge and take up an enfilading position some distance behind. The rear edge may be cut so as to leave well defined salients into which the attackers may crowd and so provide a good target. In making clearances, much can be done by judicious thinning, and large trees should not be felled. Communications throughout the wood should be blocked.

54.—Defence of Outposts.

(See also F. S. Regs., Pt. I, Sec. 76.)

1. Outposts will always be entrenched, and advantage should be taken of natural cover to save time and labour in the construction of their defences. These works should, if possible, have an all-round field of fire, and protection against reverse fire, and should be surrounded by an obstacle. Where the outposts are within the field of fire of the main body, they must be protected from its fire in order to mask it.

2. Pl. 30, Fig. 1, shows the section of a post for a piquet, which gives an all-round field of fire and overhead cover. It will rarely be possible to construct such elaborate works, but the principle of construction will be the same for works of the most elementary order.

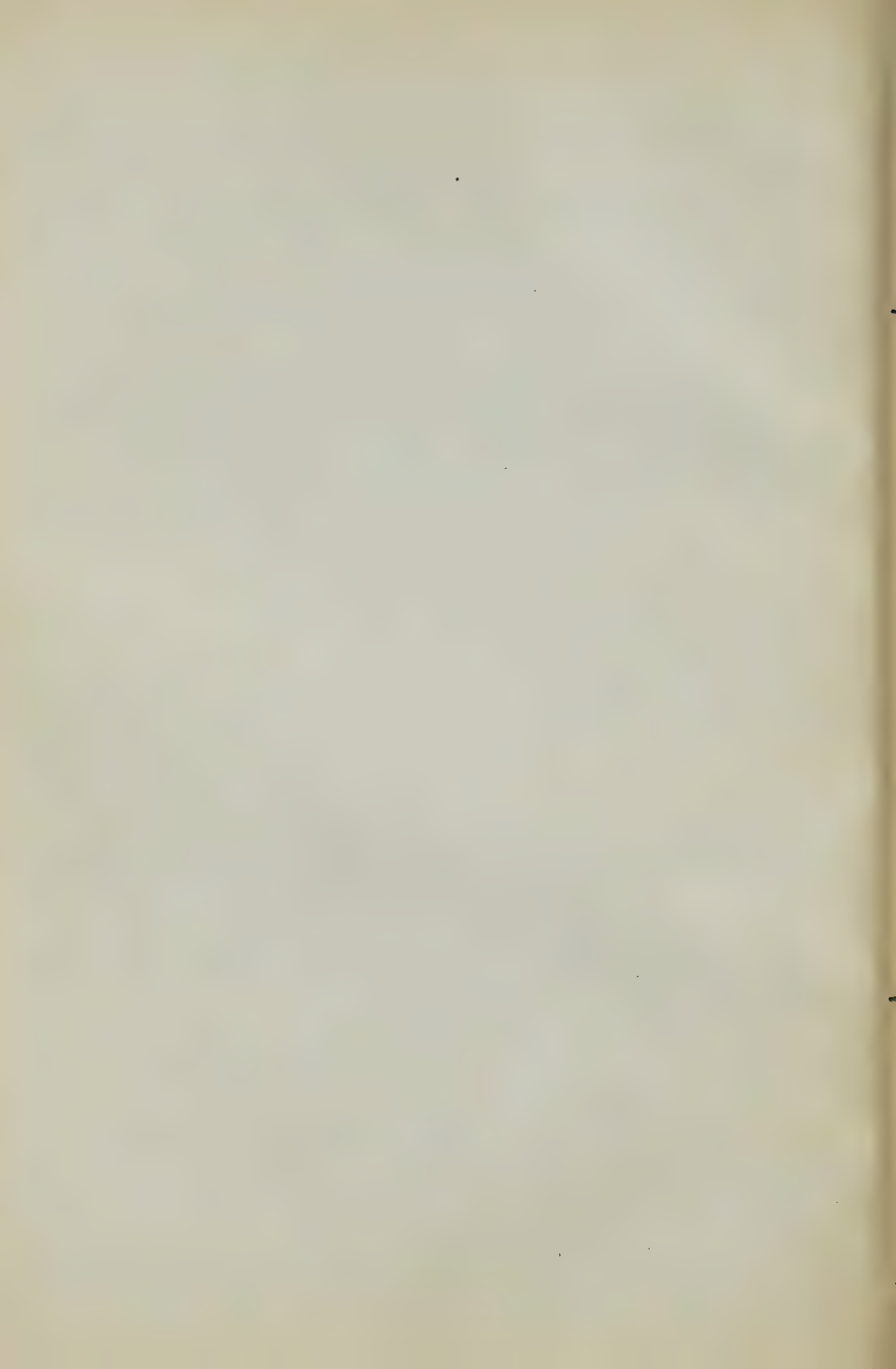
3. Pl. 30, Fig. 2, shows the plan of a post for four men, which does not require a high command and from which fire can be delivered in any direction.

55.—Line of Communication Defences.

(See also F. S. Regs., Pt. II, Sec. 11.)

1. Campaigns often entail a long line of communications in a more or less hostile country. Even when protected by a field army this line is liable to raids and must, therefore, be protected by fortified posts. These posts may cover (a) a comparatively large area of ground in order to afford protection to supply depôts, convoys and transport animals, or, in case of a railway, to rolling stock, station buildings, telegraph stations, &c.; (b) a very limited area in order to defend a bridge, a signalling station, or similar object.

2. As every man employed on communications means one less



in the field army, the garrisons of such posts must be kept as low as possible, and every effort must be made to economize men by a skilful use of ground and field fortifications. Sometimes the site of a post may have to be in a spot chosen for reasons other than tactical ones; and careful dispositions, including the provision of good artificial protection, will then be more than ever necessary.

3. A proportion of the garrison should, if numbers permit, be kept in hand and only as a last resource should the defensive perimeter be manned by the whole force.

4. When organizing the defence of a post special attention should be paid to the following points:—

- (i) Defenders should be quartered close to the positions they have to man.
- (ii) Arrangements for storage of ammunition, water and supplies.
- (iii) Provision of strong articles.
- (iv) Adequate cover with a clear field of fire.
- (v) Provision of automatic alarms, if possible.
- (vi) Good communications, including telephones, telegraphs, and signalling.

5. Plenty of time is usually available for the organization of the defence, and given adequate supplies of ammunition, food, water and material, small posts can be made practically impregnable against raid attacks, even when supported by artillery, while larger posts can be occupied in such a manner that the risk and loss involved in an attempt to force into them, even under cover of darkness, would rarely justify the attempt.

6. The garrisons of isolated works cannot, as a rule, be reinforced from a distance when attacked at night, and for this reason it is essential that they should be self-contained.

7. The main defences of a post of class (a) will consist of a ring of closed and self-contained works supporting each other. The number of these works and their distance from the centre will depend on the ground and the garrison available. The intervals should, if possible, be closed by a strong obstacle flanked by fire from the works.

In most cases an inner line of defence will be required, and possibly a "keep." This inner line will not be so elaborate as the outer, and will generally consist of fortified houses, garden enclosures, small block-houses, &c. placed in the outskirts of the village or dépôt and arranged so as to sweep all approaches and internal communications. The strongest work in the post will form the "keep" irrespective of its position in the inner or outer lines of defence; and reserves of supplies, ammunition and water should be arranged accordingly.

8. The posts of class (b) will consist of one or more closed works, whose garrisons may vary from 6 to 50 men.

9. The types of works will necessarily depend on the nature of the probable attack as well as on the materials available. Invisibility is not essential.

Head cover is necessary, and overhead cover often desirable; and, since the attack may come from any direction, protection against enfilade and reverse fire must be provided. If the enemy is provided with artillery, well-concealed deep trenches and splinter-proof cover must be provided (unless the ground affords adequate cover close at hand). Against rifles only, bullet-proof blockhouses will suffice. (Pl. 26.) Against badly armed savages, stockaded enclosures may be enough. (Pl. 24.)

Pl. 27 gives an example of a defensible post where the blockhouses are arranged to enfilade the lines of obstacles. South Africa produced corrugated iron and shingle blockhouses surrounded by barbed wire (P. 26); on the north-west frontier of India, stone sangars are the rule; in the Lushai Expedition of 1889, bamboo stockades were employed (Pl. 24); in the Soudan, breastworks of sand and thorn zerebas. Where railway stations have to be protected blockhouses, stockades and splinter proofs made of rails, and loopholed buildings will predominate. (Pl. 25.)

In savage warfare hints as to the best design of defensive work may generally be got from the enemy, who will have evolved the types best suited to local materials, as well as to resist the form of attack and weapons which he will employ against us. Such types, when improved by the light of our own knowledge, modified to suit our weapons, and executed with the aid of good tools and engineering skill will, as a rule, be suitable for our own use.

10. Stockades are improvised defensible walls, which, in addition to affording cover to their defenders, form a fair obstacle to assault. They are only suitable for passive defence in positions where they are not exposed to artillery fire. The commonest forms of stockade consist of earth, gravel or broken stones, &c., between two walls of planking, corrugated iron, &c. The necessary thickness can be obtained from the table in Chap. I, Sect. 2. Types of stockades of rails and sleepers are shown on Pl. 25.

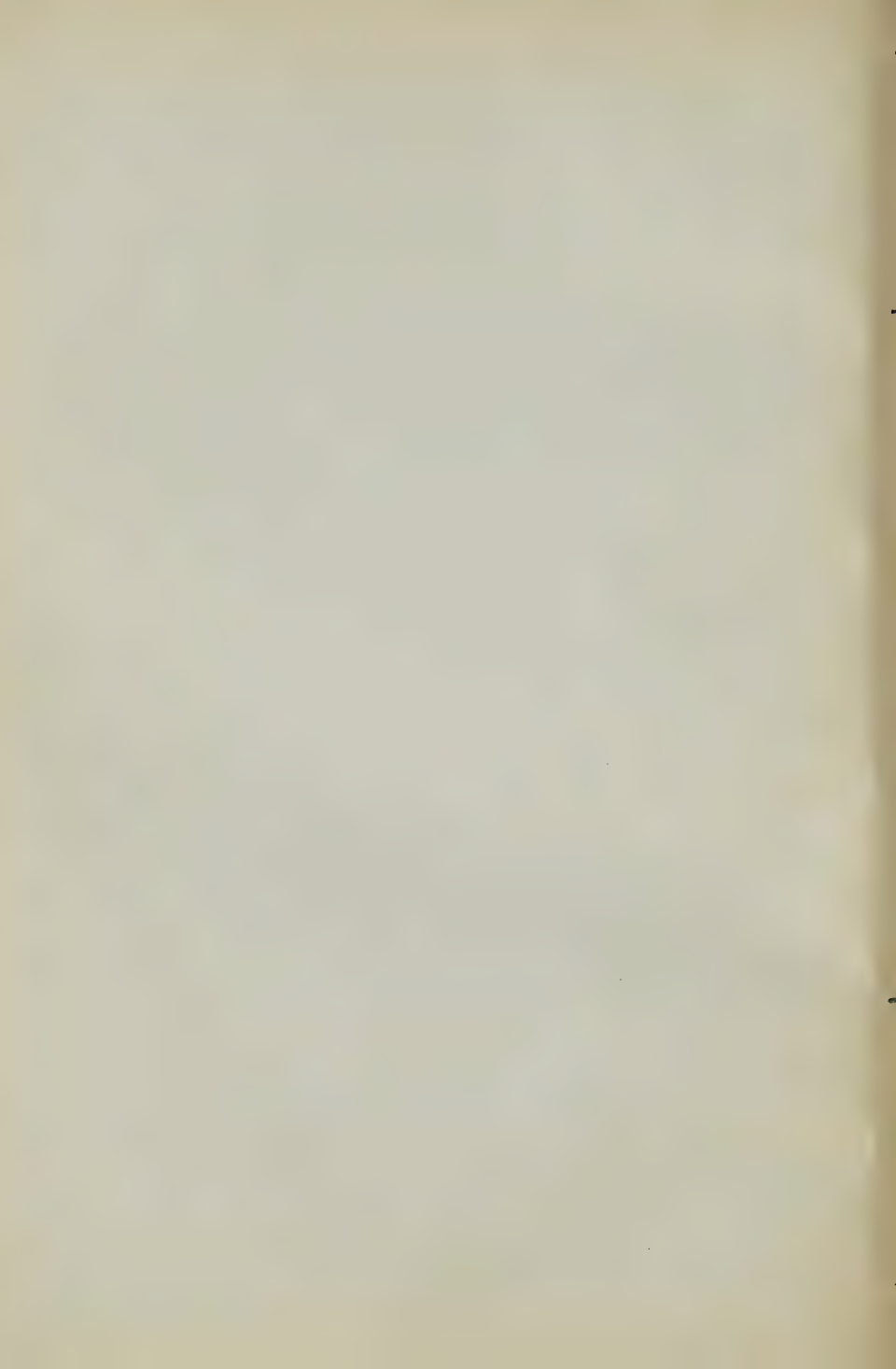
11. The loopholes through which the defenders deliver their fire should be so arranged that the enemy, if he succeed in surmounting any obstacle that may have been made, will not be able to use them from the outside.

12. Automatic alarms and flare lights are useful against night attacks (see Section 42 (4)). They should be used in combination with obstacles if any, and either protected or concealed, so as to prevent the enemy removing them. Flare lights should be screened in rear so that the defenders may remain in shadow.

One of the simplest alarms is a row of tin pots, each containing one or two pebbles, hung on a wire fence so as to rattle when the latter is disturbed. Holes may be dug in the ground in which to hang these pots, in order to render them invisible to the attack.

Pieces of tin, such as the tops of tin pots, bent round the wires of an entanglement, answer the same purpose. In rain or wind, however, these devices make such a continual noise that they finally cease to attract attention and also prevent the sentries using their natural powers of hearing.

Pl. 28 shows how a rifle alarm can be fixed in connection with a wire fence entanglement or trip wire.



A spring-bell (such as a bicycle bell) usually forms a better alarm signal than a rifle cartridge in places where the discharge of a rifle is not an unusual occurrence.

A trip wire, or one of the wires in a fence, can be arranged as in Pl. 29 to fire a cartridge, which in its turn will ignite a flare. To connect the flare with the cartridge, one end of a piece of instantaneous fuze is inserted into an empty cartridge case and pushed well up to the cap, the mouth of the case being pinched to keep the fuze in position. The other end of the fuze is bound up with loose cordite or flaked guncotton, a little dry tow arranged round it, and the whole covered with tow, straw, dry grass, etc., saturated with oil.

Alarm signals and flares should always be so arranged that they can be operated at will by the defence, and not only by the enemy.

13. On a dark night, it is difficult to ensure the men's rifles being aimed in the required direction. Any device to assist them in this matter is useful. Fixed rifle rests may be made, or failing these, some such device as a wooden bar can be arranged across the loopholes, to prevent a man raising his rifle barrel too high. Posts painted white on the defender's side make a good aiming mark, if the night is not too dark.

14. Particular attention should be paid to the entrances of closed works. They may be closed by a gate, barbed wire or other moveable obstacle. When wire is used, a good plan is to construct a winding approach, making access by night difficult. (Pl. 26, Fig. 3.) In all cases entrances must be covered by the fire of the defence. Entrances to admit vehicles require a width of 8 feet, and may be closed by chevaux de frise.

56.—Defence of Camps.

(See also F. S. Regs., Pt. I, Sect. 143 and 154, and Military Engineering, Pt. I, Sec. 17.)

1. When operating in mountainous country against an uncivilized enemy who is likely to make night attacks, the three principal points to attend to are: (a) an outer line of strong self-contained piquets, placed so as to deny to the enemy all ground from which he could fire into the camp; (b) a well defined firing line, round the camp itself; (c) a good obstacle in connection with it.

2. When the number of defenders is insufficient to provide an all-round defence, the perimeter must be defended by flanking fire from works constructed with that object, and especial attention must then be paid to providing as formidable an obstacle as possible.

3. The positions to be taken up in order to repel a night attack should be marked out as soon as possible after the force has reached camp. If there is only time to do this with a line of stones, it will give the defenders a definite line to occupy and hold on to.

4. For convenience in camping, troops should generally occupy the same relative positions each night; but this convenience must be sacrificed to the arrangements necessary for defence, as it is very important that units should camp close to the camp which they would have to hold in case of attack.

5. In selecting a camp site attention must be paid to the water supply and its protection; but the first consideration is a good position against possible night attacks.

6. When operating in open country not of a mountainous nature, or in bush warfare piquets will often be withdrawn by night. In such cases a well defined firing line combined with an efficient obstacle must be provided round the camp. It may under certain circumstances, be advisable to apply this principle whenever the force halts in order to provide an asylum for the non-combatants and transport. These improvised defences may take the form of laagers or zerebas. Laagers are enclosures formed with the vehicles accompanying a force, supplemented by breastworks of pack saddles, stores, etc, and strengthened with trenches and abatis. Zerebas are enclosures fenced in by abatis of thorn bushes. It being most important to obtain a clear field of fire, the bush nearest the side of the camp must first be removed and arranged round the perimeter. Subsequently tracks and hollows, by which the enemy might approach, may be filled with thorn scrub if time allows,

7. In all cases a cross-fire should be arranged to sweep the lines of obstacles and the most likely avenues of approach; for this purpose machine guns are especially valuable. The general trace of a laager or zerebra, should as a rule, be in accordance with the principles shown in Pl. 27.

INFANTRY IN DEFENCE

I. T.—Cap. II

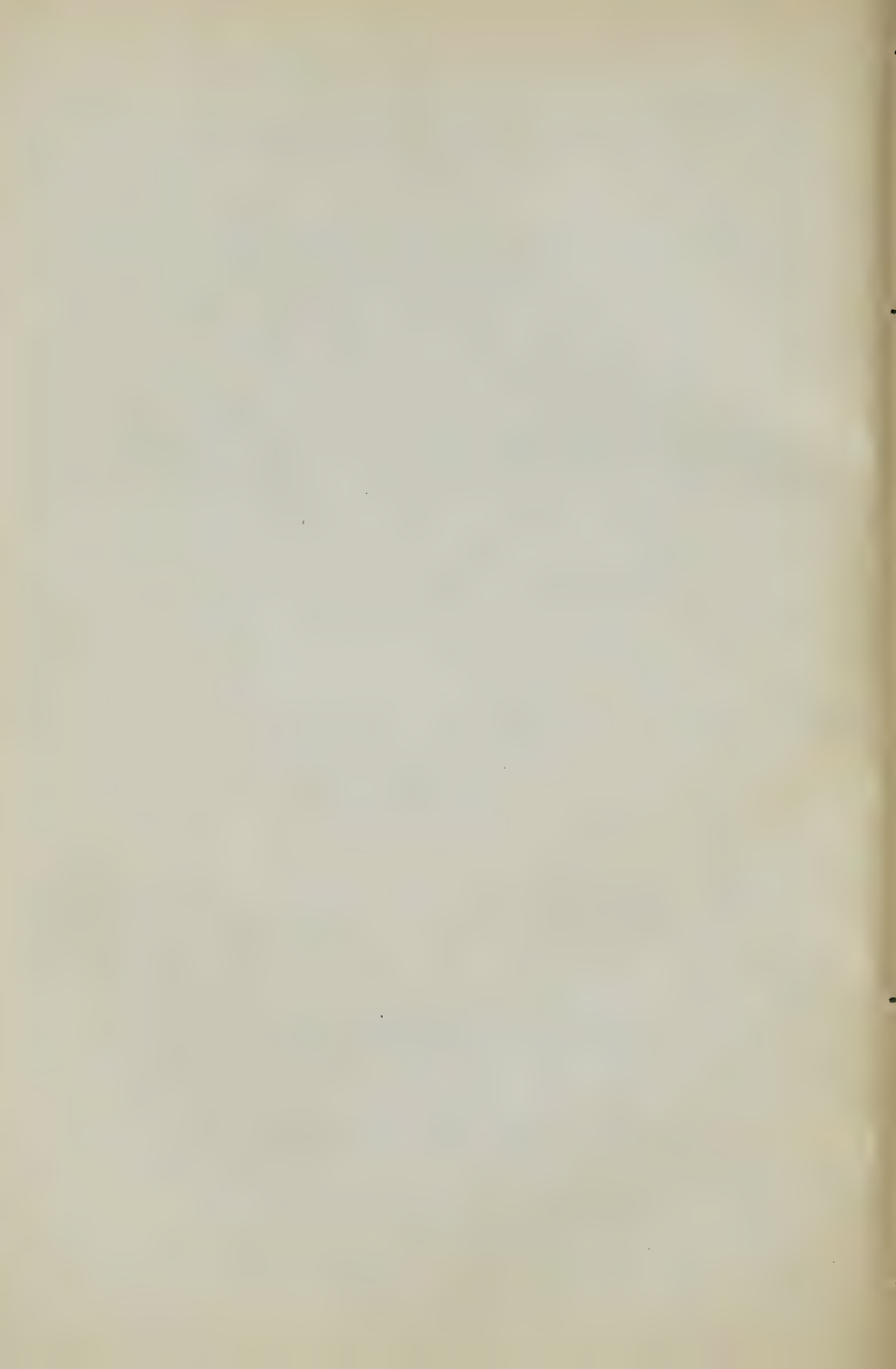
Section 129. The preparation of the position for defence. Subsection 7 and section 130. Use of covering troops.

(See commencement of II Defence.)

(F) FIRE DIRECTION AND FIRE CONTROL

(I. T. Cap.—Infantry in battle. Sec. 116.)

(See "Attack". Second Stage "a").



(G) LOCAL COUNTER ATTACK

The conduct of the Infantry fight in the defence of a position.

(I. T. Cap. 11.—Infantry in Defence. Section 131. Sub-section 3.)

(See commencement of "II Defence").

(H) COUNTER CHARGES

(See commencement of "II Defence").

(I. T. Sec. 131.—Subsection 4.)

(J) THE ASSUMPTION OF THE OFFENSIVE

(See commencement of "II Defence").

(I. T. Cap. 11.—Infantry in Defence.—Sec. 133.)

(K) THE DEFENCE IN CLOSE COUNTRY

The defence in close country

I. T.—Cap. 13.—Fighting in close country.—Section 140.

1. The chief difficulties of a protracted defence in close country have been described in Sec. 138. These difficulties may to some extent be removed by clearing the foreground and by improving communications.

2. Sufficient preparation to prevent the attacker from concealing the direction of his main attack more effectively than he could do in open country will however be rarely possible.

It will be advantageous usually to throw forward a screen to force early deployment, this screen falling back gradually on to or round the main defensive position. This end can also be achieved by pushing forward small bodies of infantry along the roads open to the enemy.

It will often be advisable to penetrate the enemy's screen by means of local counter-attacks in order to discover his plans and defeat the heads of his columns before they deploy. Such attacks, being specially intended to obtain information, may usually be delivered sooner than counter-attacks intended to repulse the enemy's firing line and to force him to use up his reserves (*see* Sec. 131. 3.).

3. The difficulties of the defence depend very much on the nature of the country.

When enclosed country is flat artillery has few opportunities, but when it is undulating, though the field of fire at close infantry ranges is often very limited, it is usually possible to make effective use of fire at longer distances.

Enclosed country is also frequently provided with such a network of roads as to reduce considerably the difficulties of manœuvre.

4. As a general rule commanding positions in enclosed country, unless they have exceptional advantages in the form of an increased field of fire, should be avoided. They serve as an easy objective to the enemy's infantry and artillery and obviate many of the difficulties which the attacker has to overcome.

II. DEFENCE—II. PASSIVE DEFENCE

II PASSIVE DEFENCE

THE PASSIVE DEFENCE

General Principles

(*I. T. Cap. 9.—Infantry in Defence.—Sec. 134.*)

1. A passive defence (*see* Sec. 125,) can, at most, repulse an enemy's attack; it can never, of itself, achieve a decisive success.

When employed against an active enemy, who has liberty of manœuvre, it is exposed to the risk of crushing defeat.

For these reasons resort should never be had to a passive defence when the end in view can be obtained by other means.

2. When the object in view is merely to gain time it is usually preferable to employ manœuvre rather than passive defence (**see** Sec. 135).

Passive defence may, however, be used with advantage to gain time when the enemy's power of manœuvre is limited, as, for example, when a position which it is difficult to turn can be occupied.

3. The general principles of the defence of such a position are similar to those described in Secs. 128 and 129 in the case of active defence, with the exception that, as no general reserve is required to initiate a general offensive, almost the whole of the troops may be utilized for the defence of the position.

The frontage occupied may therefore be greater than would otherwise be the case, and it will be an advantage if both the front and flanks of the position are covered by obstacles.

Fire may be opened at long range; and every effort should be made to impose upon the enemy and delay his attack. (**See** Sec. 130.)

4. The garrison of a defensive post, which is not strong enough to resort to an active defence, may have to confine its efforts to beating off attack, that is to say, to a passive defence.

Instructions for the organization and preparation of defensive posts are contained in the Manual of Field Engineering.

II DEFENCE—III DEFENCE OF A WOOD.

A wood in the defence.

(I. T. Cap. 13.—*Fighting in close country, etc. sec. 144.*)

1. If a force is acting temporarily on the defensive, and the general line to be occupied includes a wood or woods, the question as to whether or not the line of defence should include the wood will depend.

(a) On the configuration of the ground.

(b) The general disposition of the force.

(c) And the extent and nature of the wood itself.

2. Generally speaking, if the wood is of small extent and can **be outflanked, the most suitable position for the infantry will** be in front of it.

If, on the other hand, the wood is large, and the configuration of the ground and general disposition of the force admit, it may be preferable to take up a position in rear, with the object of bringing a heavy artillery and infantry fire to bear on the enemy at close range when he attempts to emerge.

When it is desired to make use of a wood in front of a defensive position with a view to breaking up an enemy's attack it will usually be advantageous to hold the front of the wood.

3. In the case of a position being taken up in rear of a wood, it may sometimes be advisable to throw detachments forward into the wood itself with a

view to harassing the enemy's advance, or if suitable clearings exist, to offer a stubborn resistance at such points.

If time permits it may, in the absence of suitable clearings, even be advisable to clear portions of the wood for this purpose.

Abattis and entanglements should be prepared both inside the wood and at its edge, and careful arrangements made for the withdrawal of the advanced troops well ahead of the enemy.

4. In holding the front face of a wood, though the wood itself may provide valuable cover for supports and reserves, it is rarely advisable to hold its actual edge, which usually presents an easy target to the enemy's artillery.

If it is often possible by clearing undergrowth and the lower branches of trees to establish a firing line some distance inside the wood, or trenches may be sited well in front of it, covered communication with the supports or reserves inside being arranged.

When the front edge of a wood is held, and guns are used in close support, careful arrangements must be made beforehand for their rapid withdrawal to the rear in the case of necessity.

Should the enemy succeed in entering the wood, counter-attacks must at once be delivered on the initiative of subordinate commanders, and every effort made to dislodge him at the point of the bayonet.

5. When it is for any reason desired to act on the defensive in a large wood, and the outer line is too extensive to be held by the troops available, the wood may be defended effectively from a position prepared in the interior.

A short field of fire will then be sufficient to prevent the attacker, who cannot easily be supported by artillery fire from leaving cover to continue his advance.

A position of this nature should be on some well-defined feature, such as a road, a ride, or stream. It should be artificially strengthened by means of breastworks, abattis, &c., and the ground in front should be cleared as far as time permits.

Guns and machine guns should be placed in position with the infantry, special arrangements being made for their prompt withdrawal in case of necessity.

See also "Manual of Field Engineering" Cap. 7 (Defence 2E.)

II DEFENCE.—IV DEFENCE OF A VILLAGE.

Defence of a village

(I. T. Cap. 13.—*Fighting in close country, woods, &c.*,—Section 146.)

1. When a village forms part of a general defensive line, the considerations which affect the question of its defence will be similar to those discussed in Sec. 144, (a word in the defence) but the facilities it affords for

water, cover, and shelter may usually be expected to point to the advisability of its inclusion in the main position.

2. In arranging for the defence of a village, whether it be isolated or in the main position, a definite garrison should always be allotted to it, and the defence of the whole village placed in the hands of one commander.

The commander will divide the village into sub-commands as required, and will keep a reserve under his own hand.

3. It will usually be advisable to arrange for the garrison to be located, during the earlier stages of an attack, in trenches well to the front or on the flanks rather than in the actual buildings, which may be an easy mark for hostile artillery.

If the configuration of the ground will admit, these trenches should be so arranged that a flanking fire can be brought to bear on the attacking troops as they approach, and guns may sometimes be posted in close support of the infantry, careful arrangements being made for their withdrawal in case of necessity.

4. In preparing the interior of a village for defence houses should be loop-holed, communications from house to house improved or improvised where required, and roads barricaded with a view to offering a stubborn resistance at close quarters (**see also** Manual of Field Engineering, Chapter VII).

Special preparations should be made at important points such as cross roads, village greens, or market squares, trenches and breastworks being arranged on the defenders' side of these places, and it may sometimes be advisable to prepare a central "keep."

Communication with the commander of the village and the various portions of the garrison will usually be best achieved by sending back messages to some central point in rear.

5. Should the enemy succeed in entering the village, every effort must be made to dislodge him by means of counter-attacks delivered on the initiative of commanders of subsections of the defence.

The flanks will be specially liable to attack at this time and special precautions must be taken for their protection.

6. In the event of the defenders being forced back to their positions in the interior the retirement should be covered by vigorous bayonet charges and by fire from the houses.

Every effort must be made to keep the men in hand, and subordinate leaders must realise that their personal bearing at this time will have the greatest influence on the fight.

7. In instructing troops in the principles of street fighting, the comparative difficulties of shooting to the right or left from a window should be explained, together with the corollary as to which is the safer side of a street to remain on when advancing in face of the enemy.

See also "Manual of Field Engineering, Cap. 7: (Defence 2E.)

III. PROTECTION.—I. THE ADVANCED GUARDS.

1.—ADVANCED GUARDS

Field Service Regulations, Part I.—Chap. 5.—Sections 66-69.

(A) A COMPANY FORMING PART OF ADVANCED GUARD, DE- PLOYING RAPIDLY AND ATTACKING SMALL LOCALITIES

LOCAL PROTECTION

THE TACTICAL ADVANCED GUARD

66.—Composition and strength of an advanced guard to a force advancing.

1. The composition and strength of a tactical advanced guard will depend upon the situation and upon the nature of the general protective screen which may be provided in front of it (Sec. 65).

The strength of the tactical advanced guard of a force which is marching independently or is covered by mounted troops only may vary from a fourth to an eighth of the whole force, but should be sufficient to enable the advanced guard to carry out its duties (Sec. 68).

2. An advanced guard is divided into a **van guard** and a **main guard**. As it has to reconnoitre and fight, it will usually be composed of all arms. The proportion of each arm will depend chiefly on the character of the country.

In an open country, the proportion of mounted troops and guns may be much greater than in a close or mountainous country.

3. **The special duty of the van guard is reconnaissance.** It will therefore, generally be composed of the advanced guard mounted troops, with or without a body of infantry as a support.

By day, when the country is open and the advanced guard is strong in mounted troops, infantry will not as a rule form part of the van guard.

Field artillery will seldom accompany it, but a party of engineers should usually be added.

The main guard comprises the troops of the advanced guard not allotted to the van guard.

67.—Advanced guard commander

1. The advanced guard commander, on taking over his duties, should be informed

- (1) of what is known of the enemy,
- (2) of the strength and composition of the advanced guard,
- (3) and the of intentions of the commander.
- (4) He should receive clear instructions as to engaging the enemy, if he is met in any force (Secs. 68 and 111).

2. On receipt of his instructions, the advanced guard commander will issue his orders. In these he will explain:

- (1) the general situation,
- (2) the route to be followed,
- (3) the composition of the van guard and main guard,
- (4) the order of march, and the hour of starting.

3. He will take steps to ensure that connection is maintained between the different parts of the advanced guard, and also with the main body.

68.—Action of an advanced guard to a force advancing.

1. The advanced guard must protect the main body from the moment the march of the latter begins.

The advanced guard commander will therefore decide the hour at which the advanced guard will clear the starting point and the distance at which it will precede the main body. This distance will vary with the nature of the country and the tactical situation. It should be sufficient to enable the main body to deploy should the enemy be met in force, and to admit of minor opposition being overcome without checking the main column.

2. It is **most important** that when an enemy is met the commander of the force should have information on which to base his plans and time to put them into execution when they are formed.

The first troops to be met will be the enemy's advanced troops and until these have been driven back it is rarely possible to obtain detailed information as to the enemy's dispositions.

It is the duty of advanced guards to assist the mounted troops, when necessary, in driving, in the enemy's covering troops.

The action of the advanced guard must be regulated solely in the interests of the force which it is covering, and at every stage the advanced guard commander must consider the effect of his action on the plans of the commander of the force. If the commander of the force has decided on offensive action the advanced guard commander should secure any tactical points which may assist the development of the attack of the main body. To effect this it is justifiable for him to deploy on a broader front than would be advisable for a force of the same size entering on a decisive action, for every moment brings the main body closer.

Should the commander of the force wish to avoid being drawn into a decisive engagement, the advanced guard commander will use all means at his disposal, short of committing the main body, to delay and hamper the enemy and to discover his dispositions.

If the advanced guard commander is in any doubt as to the intentions of the commander of the force, he must act on his own initiative, **remembering that by driving in the enemy's advanced troops at once he will usually assist the commander of the force in coming to a decision and that this will rarely interfere with the latter's liberty of action, while hesitation and delay may do so by allowing the enemy to seize the initiative.**

3. The van guard is responsible for protecting the main guard against surprise.

In open country mounted patrols should seldom be less than four or five miles in front of the main body.

In any case all ground within effective field artillery range must be searched.

The advanced guard mounted troops should always keep in communication with the protective cavalry, and with columns moving on parallel roads.

If constant connection between two columns is difficult to maintain, arrangements should be made between them for communicating at stated places or intervals of time during the march.

69.—Advanced guard in a retreat

1. It is always advisable to have a small advanced guard to a retreating force. Its special duty is to clear away obstacles that would delay the march. But it should observe all precautions against surprise, and should be invariably accompanied by some mounted men for scouting purposes.

A party of engineers should be attached for the removal of obstacles, or the preparation of bridges, &c., for demolition after the rear guard has passed.

2. Should it be possible for the enemy to intercept the head of the retreating column, a strong advanced guard of all arms will be required.

II.—PROTECTION II.—FLANK GUARD

THE FLANK GUARD

F. S. R., Cap. 5.—Section 70.

70.—General Principles

1. If there is any possibility of a column on the march being attacked in flank, flank guards should be detailed. They will usually be furnished by the main body, but may sometimes be dropped by the advanced guard.

2. The strength, composition, and disposition of a flank guard and its distance from the main body are governed by the principles which apply to all protecting detachments. The flank guard may either move parallel to the main body, or take up a position on the threatened flank. A flank guard may be required to hold its own without support until the main body and transport have passed.

3. Should the main body change direction so that the march becomes a flank march (*i.e.*, a march across the enemy's front), it will generally be advisable to use the old advanced guard as a flank guard, and to form a new advanced guard from the main body.

III.—PROTECTION. III.—THE REAR GUARD

F. S. R. Pt. I.—Secs. 71-74.—I. T. Sec. 137.

THE REAR GUARD

71.—Duties, composition, and strength of the rear guard to a retreating force.

1. The first requirement of a defeated force is to be relieved from the pressure of pursuit. This is effected by detaching a portion of the force, the strength of which will depend on the situation, as a rear guard to impede the enemy's advance. The remainder of the force is thus enabled to move in comparative safety, and to recover order and **moral**.

2. **A rear guard to a force retreating is essentially a fighting force of all arms.** It should be strong in artillery and mounted troops. Artillery by reason of its long range, is able to force the enemy to deploy at a distance, whilst mounted troops, on account of their mobility, can hold a position considerably longer than infantry, and prevent the flanks from being turned.

A rear guard should be lightly equipped, and should usually be accompanied by a strong detachment of engineers provided with demolition equipment.

The troops detailed for the rear guard will, as a rule, be those which have been least severely engaged.

3. The commander of a rear guard is appointed by the commander of the force to be protected. He should receive instructions as to what extent he is at liberty to break down bridges, burn villages, and destroy railways, with a view to impeding the enemy's progress.

4. When the pursuit is not close, the disposition of a rear guard on the line of march will resemble that of an advanced guard reversed; a **rear party**, usually composed of mounted men, having been formed, the remainder of the troops, when not engaged, generally move as a main guard, in the order in which they can most readily come into action.

72.—Action of a rear guard to a retreating force.

1. The conduct of a rear guard, more perhaps than any other operation in war, depends for its success on the skill and energy of the commander.

2. A rear guard carries out its mission, best by compelling the enemy's troops to halt and deploy for attack as frequently, and at as great a distance, as possible.

It can usually effect this by taking up a succession of defensive positions which the enemy must attack or turn.

When the enemy's dispositions are nearly complete, the rear guard moves off by successive retirements, each party as it falls back covering the retirement of the next by its fire. This action is repeated on the next favourable

ground. All this consumes time, and time is what is most needed by a retreating force.

A rear guard may also effectively check an enemy by attacking his advanced troops as they emerge from a defile or from difficult country.

3. In occupying rear guard positions it is important: (i) to show as strong a front as possible to the enemy; (ii) to make sure of good lines of retreat.

4. The manner of occupying a rear guard position differs from that of occupying a position meant to be resolutely defended, in that the greater part of the force should be in the fighting line from the outset, a proportionately small part being retained in reserve, and **as great a display of force as possible** being made.

5. The rear guard can best effect its object by making full use of the characteristics of the various arms:—

For the initial defence of each one of the successive positions (paragraph 2) considerable strength of infantry and artillery is essential, to force the enemy to deploy.

When the hostile attack is commencing to develop, the slower moving infantry should make good their retirement to their next position in rear, leaving to the artillery and dismounted troopers the task of covering their withdrawal, and of preventing the enemy advancing unopposed.

As the hostile attack is pressed still more closely, the artillery should be withdrawn, protected by the rifles of the cavalry. The latter by their mobility should make good their retirement at the latest moment.

A sufficient proportion of the mounted troops should be employed on the flanks to forestall any attempt to pass between the rear guard and the main body.

6. The first consideration in selecting a position for the artillery is, that it shall be able to open fire on an enemy at long range, and thus compel his infantry to assume an extended formation at the greatest possible distance.

The second is that it should be possible to withdraw without difficulty.

7. A point of great importance to the commander of a rear guard is to judge accurately the proper time to retire.

He must constantly bear in mind the difficulty of withdrawing infantry that has once become engaged.

If he retires too soon he is only partly carrying out the work required from the rear guard; on the other hand if he falls into the error of trying to dispute every inch of ground he may become seriously involved and run the risk of being cut off from the main body, or oblige the latter to halt and reinforce him.

8. When a rear guard halts to fight, every moment separates it further from the main body, whereas with a pursuing force every moment brings its reinforcements closer.

In regulating the distance of the main guard from the main body the chance of the enemy interposing between the two must be considered.

The distance, however, must be sufficient to prevent the main body being shelled by the enemy. This is especially important during the passage of a defile.

The commander of the main body should periodically keep the commander of the rear guard informed of his progress, and **vice versa**.

9. It is always advisable to send an officer to the rear to note the next favourable position for defence on the line of retreat. The lines of retirement from position to position should not converge.

The positions should be **sufficiently far apart** to induce the enemy after seizing one, to re-form column of route before advancing against the next.

10. Before withdrawing from a position, arrangement should be made to cover the retirement of the portion of the rear guard which is still engaged, by the disposition of the troops that have already retired.

11. It will sometimes be of great advantage for a rear guard to take up a delaying position one or two hours before dark. The enemy may hesitate to attack with darkness approaching, and delay at that hour will probably seriously curtail the length of his march.

73.—Expedients for delaying an enemy's advance

1. With a view to delaying the enemy's advance, the following expedients may be resorted to:—

i. Narrow roads, &c., can be blocked by locking together several wagons and removing one or more of the wheels, or by felling trees across them.

ii. Fords may be rendered impassable by throwing in ploughs, harrows, &c.

iii. Boats may be removed to the side of the river farther from the enemy and sunk or burnt.

iv. Villages, woods, heather, scrub, &c., if the circumstances demand it, may be set on fire by the rear party, so as to conceal the movements of the rear guard and impede the enemy's advance.

2. Skilfully laid ambushes will cause the enemy to move with caution in pursuit.

74.—Rear guard to a force advancing.

1. If there is any chance of the rear of an advancing column being exposed to the enemy's attacks, the rear guard may be composed of all arms and must be sufficiently strong to meet all emergencies.

If it is to be employed only in collecting stragglers and keeping off marauders, it is usually composed of infantry, with sometimes a few mounted troops added for watching the flanks.

2. If the main body and the train march without any considerable distance between them, one rear guard will usually suffice for the whole, but if for any reason there is a considerable distance, the rear guard will follow the main body, and special arrangements will be made for the protection of the transport (re convoys **see** Sec. 157, 2.)

137.—Retirements*I. T. Ch. 12—Sec. 137*

1. Retirements in face of the enemy must be conducted with the greatest circumspection. A hurried retreat is not only a fruitful source of panic but a great encouragement to the enemy. A steady, deliberate retirement, on the other hand, carried out in silence and good order imposes respect and caution on the hostile troops.

The general principles governing the action of a rearguard to a retreating force are contained in Field Service Regulations Part I, sections 71 and 72.

2. In retiring under fire, portions of the firing line should usually retire alternatively, affording each other mutual support by taking up successive fire positions at some considerable distance apart, from which the retirement of the portion nearest the enemy can be covered,

3. Machine guns skilfully handled may be, of great assistance in movements of this nature, and the detachments must, if necessary, be prepared to sacrifice themselves to cover the retirement of their infantry.

4. Men retiring under fire in extended order should, if well in hand, move from cover to cover at the quickest possible pace, a few men, preferably the most active, being left behind at each halt to cover the retirement of the remainder, and rapid fire being used to deceive the enemy as to the number left behind.

If, however, the men are at all shaken, as when an attack has failed, every effort must be made to rally and restore order.

All ranks should exert themselves to the utmost to ensure that the retirement is carried out, notwithstanding losses, with steadiness and precision.

5. If the enemy presses hard, a sudden counter-attack, not followed up too far, may give good results.

6. When mounted troops are available, they will be used to cover the final withdrawal of the infantry from each successive fire position.

III.—PROTECTION. IV.—OUTPOSTS

4. Outposts.*Infantry Training. Chapter 14*

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Note.—During elementary training it is usually advisable for the Company to be divided into piquets only, the support being represented by a flag.

Later in the training a normal distribution will be made of piquets and supports and practice should be given in reinforcing the piquet line at night.

The different dispositions which may have to be made when night falls should be practically illustrated on the ground. (I. T. section 151-1) and at least two complete nights of the training period should be spent on Outpost Duty.

A few men of the company should always be detailed to act as hostile patrols during training in outposts.

OUTPOSTS

I. T.—CHAPTER XIV

147.—General Principles

1. Every body of troops when halted will be protected by outposts.

2. The duty of outposts is to give warning of any threatened attack, and in the event of attack to gain time, at any sacrifice, for the commander of the force protected to put his plan of action into execution.

A force can only be regarded as secure from surprise when every body of the enemy within striking distance is so closely watched that it can make no movement without its immediately becoming known to the outposts.

The first duty of outposts, therefore, is observation of the enemy.

The second duty is resistance.

3. **Observation of the enemy** will consist of—

- i. Keeping such a close watch on all bodies of the enemy within reach of the outposts that no movement can be made unobserved.
- ii. Watching all approaches along which an enemy might advance.
- iii. Examining all neighbouring localities in which his patrols might be concealed, or which he might occupy preparatory to an attack.

Resistance will consist of delaying the enemy on a prepared defensive line, called the outpost line of resistance, until further orders are received from the commander of the protected force.

4. Outpost troops will usually consist of cavalry or cyclists and infantry working in co-operation. The **mounted troops** will be responsible for the duties of observation at a distance from the outpost line; **the infantry** for resistance and for their own immediate protection against surprise.

The outpost mounted troops will carry out their duty by means of patrols pushed well forward in the direction of the enemy.

The outpost infantry will be divided into piquets and supports, the former

to furnish sentry groups and to hold the outpost line of resistance, the latter to reinforce the piquets when required.

Outpost infantry may also be required to furnish patrols (see Sec. 156) and on occasions a portion of it may be held back to form an outpost reserve (see Sec. 149).

5. Outpost work is most exhausting; not a man nor a horse more than absolutely necessary must be employed. The duty of observation must never be relaxed, whatever the distance of the enemy, but the number of troops detailed for resistance will depend on the ground, the distance of the enemy, and the tactical situation.

6. When there is any chance of a force coming in conflict with the enemy the commander, when halting, should first decide on his dispositions in case of attack, and then arrange the quartering of his command and the general position of the outposts accordingly.

7. The distance of the outpost position from the troops protected is regulated by the time which the latter will require to prepare for action, and by the importance of preventing the enemy's artillery from approaching **within effective artillery range** of the ground on which these troops will deploy if attacked.

On the other hand, especially in the case of small forces, the distance must not be such as would permit of the outposts being cut off, or as would necessitate the employment of an undue proportion of men on outpost duty.

8. In the case of a force spread over a considerable frontage, or one distributed in depth, the commander will usually divide the outpost line decided on into sections, delegating responsibility for the holding of each section to the commander of a subordinate unit or formation, and defining the limits of sections by distinctive features, such as trees, cottages, or streams.

A road is not a suitable boundary for a section.

Each subordinate commander concerned will then detail the necessary troops for his own portion of the outpost line and will appoint an officer to command them. (This officer will be designated the outpost commander).

He will also be responsible that his outpost arrangements are co-ordinated with those of the sections on his flanks.

9. In the case of a small force the commander will usually himself detail the whole of the outpost troops and appoint an officer to command them. (This officer will be designated the outpost commander.)

10. It will sometimes be advisable that the advanced, flank, and the rear guards which have protected the force on the march should be ordered to find the outposts.

11. When outpost troops are detailed from the main body the troops which have covered the march will remain responsible for protection until relieved by the outposts. When the march is resumed outposts must not be withdrawn till the troops responsible for the protection of the march are in position.

12. To see without being seen is one of the first principles of outpost duty. All troops on outpost must therefore be carefully concealed.

13. Machine guns with outposts may be employed to sweep approaches and to cover ground which an enemy in advancing may be compelled to pass or to occupy.

15. Detachments in close proximity to the enemy must avoid useless collisions. **Attempts to carry off detached posts, sentries, &c., unless with some special object, are to be avoided, as they serve no good end, give rise to reprisals, and tend to disturb the main body.**

16. The outposts will stand to arms one hour before it begins to get light and remain under arms until the patrols, which should be sent out at that time (*see* Sec. 156, 6), report that there is no sign of an immediate attack.

When the outposts are relieved in the morning, the relief should reach the outposts half an hour before it begins to get light. The troops relieved will not return to camp until the patrols report all clear.

16. No compliments will be paid when on outpost duty.

148.—Duties of an outpost commander

1. An outpost commander (*see* Sec. 147, paras. 8 and 9) should be given information on the following points:—

- i. What is known of the enemy, and of other bodies of our own troops.
- ii. Intentions of the commander who appoints him, if the enemy attacks.
- iii. Where the force to be covered will halt.
- iv. The general position to be occupied by the outpost troops under his command and, if there are other troops on his flanks, the limits of the line for which he is responsible.
- v. Detail of the troops allotted to him.
- vi. Hour at which they will be relieved.
- vii. Where reports are to be sent.

2. After receiving the above information he will give such orders as are immediately necessary for protection against surprise.

He will then allot tasks to his mounted troops and will decide on a line of resistance for the outpost infantry, dividing the frontage among the outpost companies at his disposal.

When there are other outpost troops on his flanks, he will co-ordinate his arrangements with those of his neighbouring outpost commanders, and will ensure that no ground on his flanks remains unwatched.

3. In choosing an outpost line of resistance, he will remember that retirements of advanced troops on to a supporting line are always dangerous, particularly at night.

As a general rule, therefore, the piquets should be posted on the line of resistance, which must be chosen with this object in view.

Co-operation, inter-communications, and the exercise of command will be facilitated by placing the piquets along well-defined natural features, or in the vicinity of roads; but this must not outweigh the necessity for the best tactical dispositions possible.

Commanding ground is not only unessential, but may sometimes be disadvantageous.

At night little of the country in front can be seen from high ground, and rifle fire, except at close range, is useless.

For night work, therefore, if the general configuration of the ground permits, it may be advisable to select a line along low ground for the outpost line of resistance, with a sky line in front which an approaching enemy would be obliged to cross.

4. The extent of frontage to be allotted to each company will depend on the probabilities of attack, the defensive capabilities of the outpost position, and, where they exist, on the number of approaches to be guarded.

The limits of the frontage allotted to each company should be carefully defined, as in the case of sections of the outpost line (*see* Sec. 147, 8.)

5. As soon as the foregoing details have been decided on, an outpost commander will issue orders on the following points:—

- i. Information of the enemy and our own troops so far as they affect the outposts.
- ii. General line to be occupied by the outposts; frontage or number of roads allotted to each outpost company; and situation of the reserve (*see* Sec. 149).
- iii. Disposition of outpost mounted troops.
- iv. Dispositions in case of attack. Generally the outpost line of resistance and degree of resistance to be offered.
- v. Special arrangements by night.
- vi. Smoking, lighting fires, and cooking.
- vii. The hour at which outposts will be relieved.
- viii. His own position.

6. If he finds it unnecessary to employ all the troops placed at his disposal, he will decide whether to retain the surplus as a reserve or to send them back to the main body (*see* Sec. 149.)

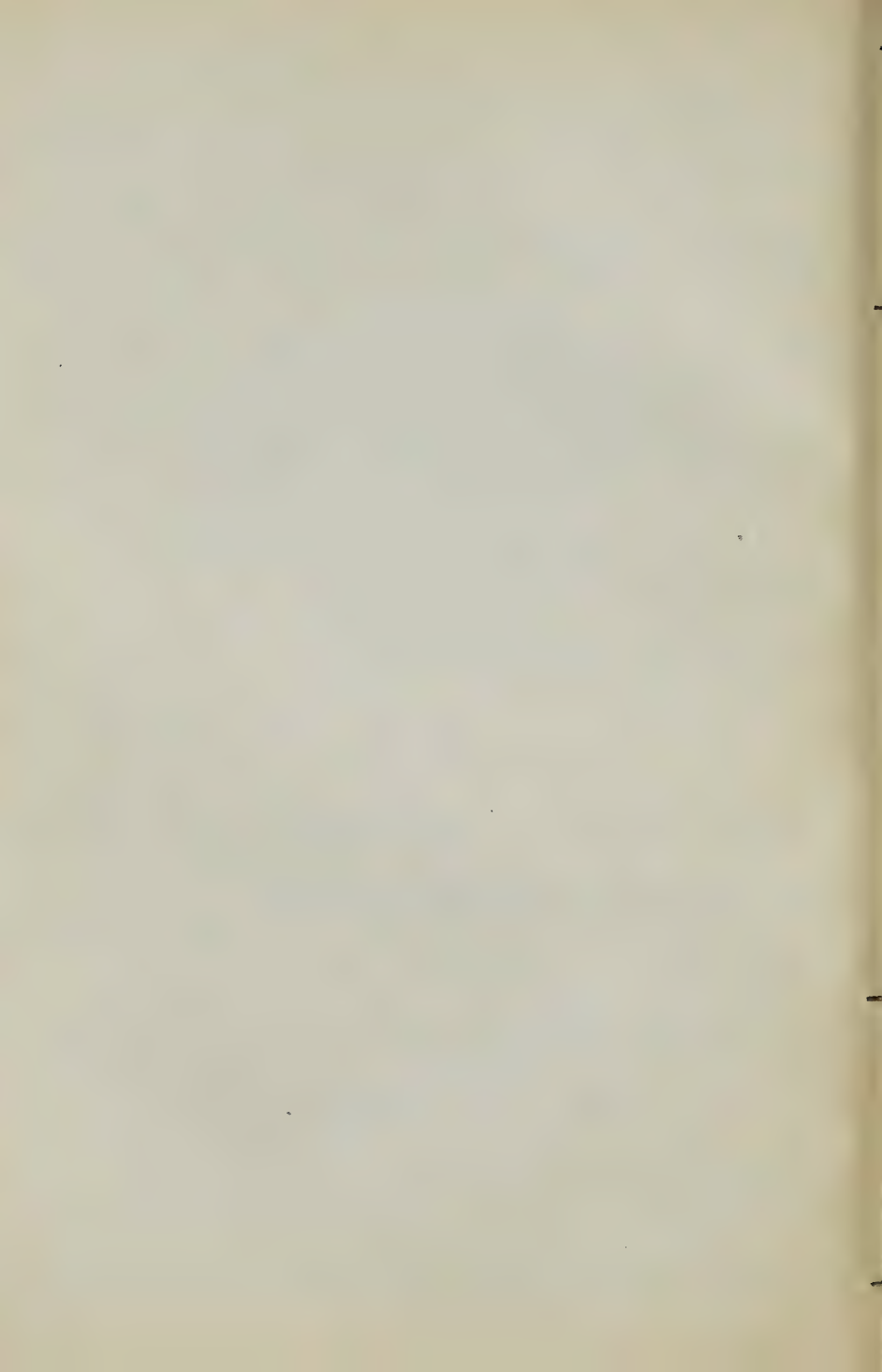
7. As soon as the outposts are in position he will inform the commander who appointed him. He will also be responsible for maintaining communication with the main body.

149.—The reserve

1. The necessity, or otherwise, for the provision of a reserve depends on circumstances, such as:

- (1) The size of the force to be covered,
- (2) The proximity of the enemy,
- (3) The probability of attack,
- (4) The time required by the troops protected to come into action in case of attack,
- (5) The distance of the outposts from those troops,
- (6) And the nature of the ground.

It lies with the outpost commander to decide whether any of the troops allotted to him shall be used as a reserve.



150.—Duties of the commander of an outpost company

1. Outpost companies provide piquets, detached posts, and supports as required.

2. The commander of an outpost company, having received his orders, will move his command, taking precautions against surprise, to the ground allotted to it, where the men will be halted under cover.

3. He will then:

(a) Examine the ground,

(b) Decide on the number and position of the piquets,

(c) And, if necessary, of detached posts, required by day and by night, and on the position of the support.

(d) He will give instructions to the commanders of piquets and detached posts, and will arrange for a protracted resistance to be made on the line occupied by the piquets, which must correspond generally with the outpost line of resistance indicated by the outpost commander, and should support, and be supported by, the companies on either flank.

4. As soon as the piquets are in position and their groups and sentries posted, he will withdraw the covering troops. Such troops as are required for night dispositions only should not be posted till after dusk.

5. If it is necessary to send out patrols (*see* Sec. 156) he will make the required arrangements, deciding whether they should be furnished by piquets or supports. When the troops who covered the company's advance to the outpost position are available it is sometimes convenient that they, who already know something of the country in front, should be detailed for this duty.

6. He will communicate with the companies on the flanks of his position, and will ascertain the dispositions of those companies, so as to ensure no ground being unprotected.

He will also maintain communication with the outpost commander.

7. Piquets, detached posts, and supports will as far as possible be composed of complete units, the supports consisting of those platoons or sections not required for piquets and detached posts.

8. The distance of the support from the piquets will depend on the ground. The support should be able to reinforce the piquet line rapidly when required, yet should be far enough away to prevent the men's rest being unnecessarily disturbed.

9. When the company is watching a very extensive front may be advisable to divide the support into two or more parts, or to detail a support to each piquet.

10. Communications between supports and piquets should be marked in such a way that they can be followed easily at night without confusion.

Every man of the support should be told exactly what he is to do in case of attack, and should be required, while daylight lasts, to get a clear mental picture of his surroundings.

11. Supports will maintain communication with their piquets, and, if there is one, with the reserve.

151.—Duties of a piquet commander

1. As soon as a piquet commander has received his orders he will move his command, by a covered approach, if possible, to a spot in rear of the portion of the piquet line for which he is responsible.

He will then examine the ground and decide on the number and position of sentry groups required, both by day and by night, remembering that no more should be used than are absolutely necessary.

By day, in open country, one sentry over the piquet, and one sentry group in front of it may often be all that is required.

He will then explain his orders to the piquet and will detail the various duties and their reliefs, including one or more single sentries over the piquet itself, for the purpose of communicating with the sentry groups and warning the piquet in case of attack.

Sentry groups required only for night dispositions will not be posted till after dusk.

2. In order to prevent the men being unnecessarily disturbed at night, he will arrange that the non-commissioned officers and men of each relief of the various duties bivouac together, and apart from the other reliefs.

All reliefs should know exactly where to find the men of the next relief.

3. He will satisfy himself that every man of his piquet knows

(1) the direction of the enemy,

(2) the position of the next piquets,

(3) and the support,

(4) and what he is to do in case of attack by day or by night.

He will then post his sentry groups, satisfying himself that no portion of the frontage allotted to him is left unwatched and will instruct sentries and commanders of sentry groups on the points enumerated in Sec. 152.

4. He will strengthen the position to be defended, providing accommodation for the support as well as the piquet, and will improve communications where necessary, without waiting for orders on these points, and will make the necessary sanitary arrangements.

5. He will impress on his men the importance, where possible, of getting a clear mental picture of their surroundings while daylight lasts, so that they may the more easily find their way about by night.

6. He will maintain communication with the piquets on either flank, arranging with them for mutual support; and while limiting as much as possible any movements in the line of sentries which might be visible to an enemy, he will satisfy himself that the sentries are alert and understand their duties.

7. Piquets will invariably be ready for action. By night the men must never lay aside their accoutrements.

8. Not more than a few men should be allowed to leave the piquet for any purpose at one time. They should never be allowed to move about in or in front of the sentry line when seeking water, fuel, forage, &c.

152.—Sentries and sentry groups

1. Sentries in the front line are posted in groups, which consist of from three to eight men under a non-commissioned officer or the oldest soldier.

These groups remain on duty for eight or twelve hours, and thus require no reliefs when the force is only halting for the night. In open country one man is posted as sentry, while the remainder lie down at close at hand; but if the country is closer or special precautions are necessary, the sentry post may be doubled.

Sentries should always be posted double when men are very tired.

2. The distance of a sentry post from the piquet depends entirely upon the ground.

Sentries should be placed so as to gain a clear view over the ground in their front, whilst concealed from the enemy's view.

To avoid attracting attention, they should not be permitted to move about on the other hand permission to lie down, except to fire, should only be given for special reasons, since sentries permitted to lie down may not remain sufficiently alert.

Sentries must be made to realize the importance of their work, and their eyes and ears must always be ready to catch any indication of the presence or the movement of the enemy.

Except at night, or in a fog, the bayonets of sentries not should be fixed.

3. **On the approach of any person or party, a sentry will immediately warn his group.** When the nearest person is within speaking distance the sentry will call out **Halt**, take cover himself, and get ready to fire. Any person not obeying the sentry, or attempting to make off after being challenged, will be fired upon without hesitation. If the order to halt is obeyed the group commander will order the person, or one of the party, to advance and give an account of himself.

4. Sentries must know, in addition to the points mentioned in Sec. 151:—

- i. The direction of the enemy.
- ii. The position of the sentries on their right and left.
- iii. The position of the piquet, of neighbouring piquets, and of any detached post in the neighbourhood.
- iv. The ground they have to watch.
- v. How they are to deal with persons approaching their posts.
- vi. Whether any friendly patrols or scouts may be expected to return through their portion of the line, **and the signal, if any, by which they may be recognized.**
- vii. And, by day, the names of all villages, rivers, &c., in view, and the places to which roads and railways lead.

Commanders of sentry groups must in addition know what is to be done with persons found entering or leaving the outpost line (**see** Sec. 153).

They must also be given explicit orders what to do in case of an advance in force by the enemy: whether they are to remain at their posts, which in this

case must be protected from fire from behind as well as from the front, or whether they are to retire on the piquet.

'In the latter case they must be warned of the danger of arriving headlong on the piquet only just ahead of the enemy. In consequence of this danger such retirements are rarely permissible at night.

153.—Traffic through the outposts.

1. No one other than troops on duty, prisoners, deserters, and flags of truce will be allowed to pass through the outposts either from within or from without, except with the authority of the commander who details the outposts.

Inhabitants with information will be blindfolded and detained at the nearest piquet pending instructions, and their information sent to the outpost commander.

2. **No one is allowed to speak**, otherwise than as directed in Sec. 152 (3), **to persons presenting themselves at the outpost line** except the commander of the nearest detached post, piquet, or outpost company, who should confine his conversation to what is essential.

Prisoners and deserters will be sent at once, under escort, through the commander of the outpost company, to the outpost commander.

154.—Flags of truce

1. On the approach of a flag of truce, one sentry or more if at hand, will advance and halt it at such distance as to prevent any of the party who compose it overlooking the posts; he will detain the flag of truce until instructions are received from the commander of the outpost company.

2. If permission is given for it to pass the outposts, the individuals nearing it must first be blindfolded, and then led under escort to the outpost commander.

No conversation except by his permission is to be allowed on any subject, under any pretence, **with the persons bearing the flag of truce.**

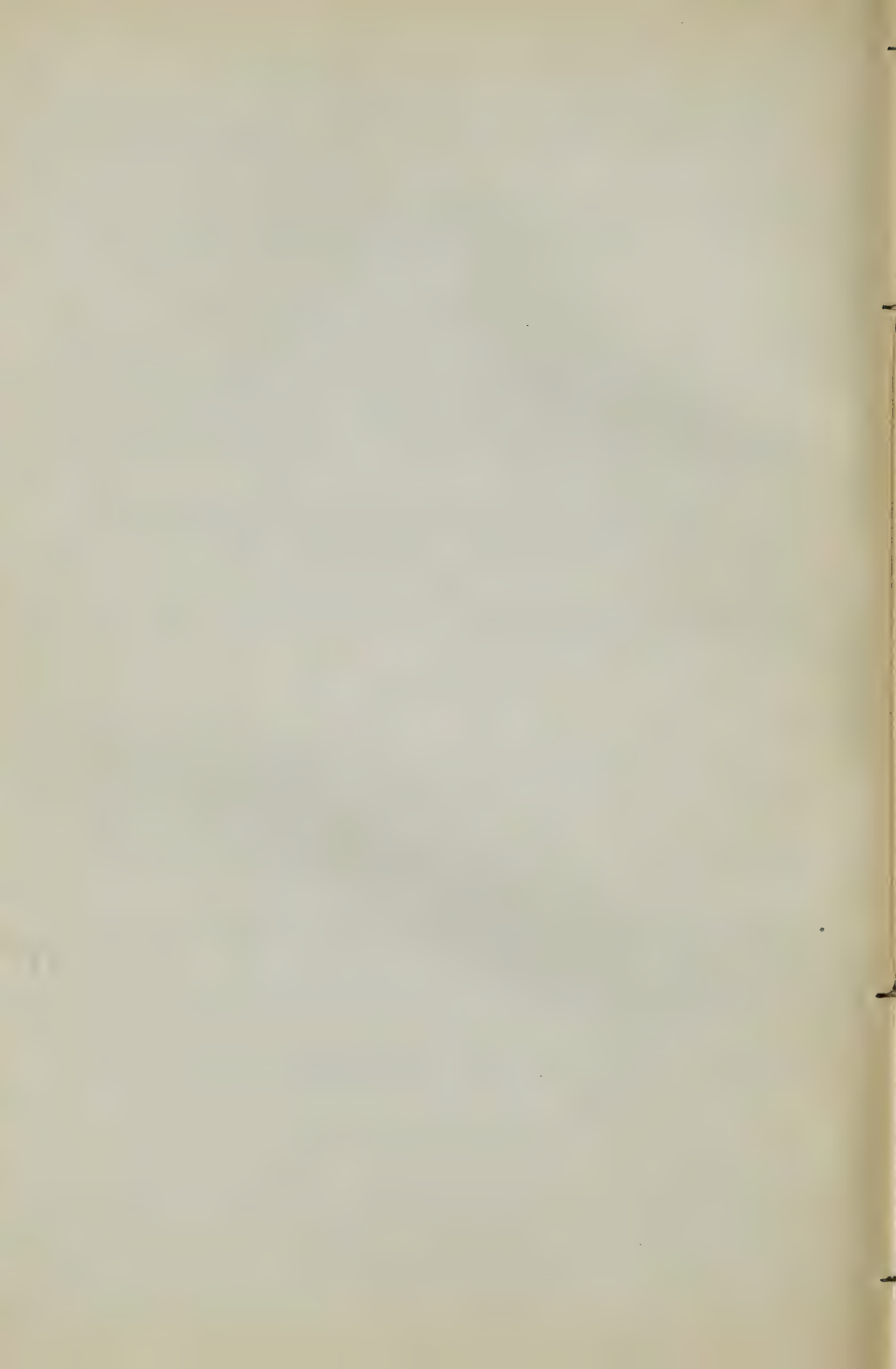
3. If the flag of truce is merely the bearer of a letter or parcel, the commander of the outpost company must receive it, and instantly forward it to headquarters.

The flag of truce, having taken a receipt, will be required forthwith to depart, and **no one must be allowed to hold any conversation with the party.**

155.—Detached posts

1. **Detached posts** from an outpost company may occasionally be necessary in front of, or to the extreme flank of, the line of resistance, to guard some spot where the enemy might collect preparatory to an attack, or which he might occupy for purposes of observation.

They should only be employed in exceptional circumstances, owing to the danger of their being cut off.



2. The strength of a detached post will depend on the duty required of it, and may vary from a section to a platoon.

3. Detached posts act in the manner laid down for piquets and sentry groups. When only required for night dispositions they should not be posted till after dusk.

156.—Outpost patrols.

1. The duty of observation as defined in Sec. 147, 3 will be carried out principally by means of patrols or standing patrols (see para. 7 below).

2. Movements of patrols through the outpost line should be as few as is consistent with the performance of this duty.

By day movements through the outpost line may disclose the dispositions of the outposts, while by night there is great danger of returning patrols being shot by their own side.

3. Whether mounted troops from the outpost line are patrolling to the front or not, every commander of an outpost company is responsible for his own protection against surprise.

He will be informed by the outpost commander as to what mounted patrols have been sent out, and must then decide what further patrols, if any, are necessary for his own security, having due regard to the principle enunciated in para. 2 above.

When mounted troops are in front it should seldom be necessary to send out infantry patrols by day unless the country is very thick or the weather misty.

By night the majority of mounted troops will be withdrawn, a few standing patrols only being left out to watch either the enemy or distant points by which he might approach, and increased vigilance will then be necessary on the part of outpost companies.

In the absence of definite orders piquet commanders are responsible for taking such action as they deem necessary for the security of their piquets.

4. **Outpost patrols**, whether mounted or dismounted, may consist of from three to eight men under a non-commissioned officer.

They should never be sent out in such regular sequence as will enable the enemy to foresee their movements.

If a force halts more than one day in the same place the hours at which the patrols go out (except those before sunrise, see para. 6), and also their route, should be changed daily.

5. An outpost patrol, when going out, informs the nearest sentry of the direction it is taking and **arranges some signal by which it may be recognised on its return.**

In the event of a patrol not returning when expected, another should be sent out. (See also Sec. 111.)

6. When mounted troops are available they should move out before it begins to get light and patrol all approaches within distant field artillery range of the outposts.

When mounted troops are not available infantry patrols should be sent

out at this time, but it will seldom be advisable for them to reconnoitre so far from the outpost position.

These patrols must remain out till after daybreak.

7. A **standing patrol** is a patrol sent out to remain at some definite spot to watch either the enemy, a road by which he might advance, or a locality where he could concentrate unseen.

Standing patrols may be furnished by mounted troops or infantry. They are of the utmost value, especially at night, as they obviate constant movement.

A standing patrol must be prepared to remain out for several hours.

Its commander must arrange to send back an immediate report of any hostile movement observed, and, if the enemy advances in strength, he must in default of other orders, **retire on the piquet line before becoming seriously engaged.**

157.—Battle outposts.

1. If the enemy is close at hand, and battle imminent, or if the battle ceases only at nightfall to be renewed next day, the whole of the troops must be in complete readiness for actions.

There may not even be room for outposts, and the troops will have to bivouac in their battle positions, protected only by patrols and sentries.

In such cases the firing line takes the place of the piquets.

It will often occur in these circumstances that no orders can be issued as to measures of protection by superior authority, and in any case nothing can relieve the commanders of advanced battalions and companies of the responsibility of securing themselves from surprise, and unless circumstances forbid, of keeping touch with the enemy.

111.—Training in the conduct of infantry patrols.

I. T. Chap. VII—Training in Field Opens

1. It will be explained that **infantry patrols** are used to obtain information of the enemy or of the ground in the vicinity of the force to which they belong.

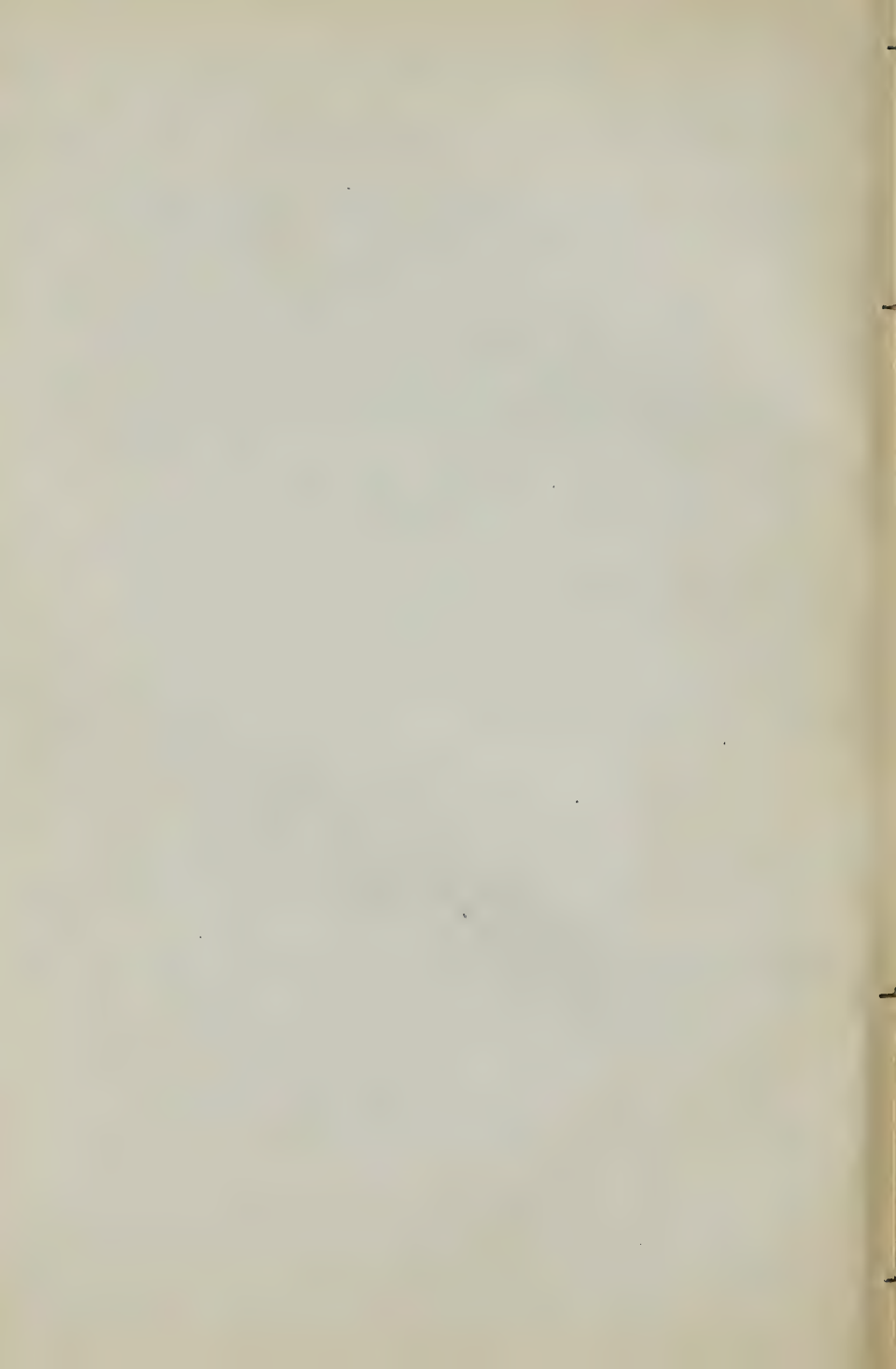
The strength of a patrol will depend upon the task allotted to it, and may consist of from two to eight men under an officer or non-commissioned officer.

2. The officer who sends out a patrol must:

- (a) Give the patrol leader definite and precise instructions as to the points on which information is required.
- (b) He must also inform him of the probable movements of other friendly troops in the neighbourhood
- (c) And must tell him what is already known of the country in which he is to operate,
- (d) The length of time he may expect to be away,
- (e) And the place to which reports are to be sent.

3. After receiving his instructions, and forming his plan of action, the leader should explain the whole, or as much as may be desirable, to his subordinates, so that every man may know how to carry on the duty in the event of accidents.

He should warn them that if captured they should refuse to give any in-



formation beyond stating their rank and name, and tell them that by international custom they cannot be punished for this refusal.

No man should carry any written instructions or documents which would give information to the enemy.

4. Patrols should remember that their mission is not only **to obtain information, but to convey it safely and quickly** to the authority who sent them out.

They should always endeavour, therefore, to move in such a formation that, if surprised, some of their number may be able to get back with the information gained.

Their usual method of advance should be by bounds from cover to cover, every opportunity being taken to escape the notice of the enemy or of hostile inhabitants.

They should keep as much as possible in the shadows, both by day and night.

Any place likely to harbour an ambush such as a wood, ravine, or village, through which it may be necessary to pass, must be approached with caution, one or two men advancing first under the cover of the rifles of the remainder.

The whole party should never rest together in the same spot, but one or more look-out men should invariably be posted at these times.

5. An infantry patrol should seldom use its rifles if its object can be achieved by other means.

But it must be clearly understood that if a small party of the enemy is suddenly encountered, the assumption of a resolute offensive will often be the best course of action.

6. Special points with regard to patrols sent out from an outpost line are discussed in Sec. 156.

III. PROTECTION

120—ARTILLERY ESCORTS

I. T. Cap. 9.—Infantry in Battle. Sec. 120

1. Artillery on the field of battle is generally protected by the distribution of the other arms.

Batteries which have a clear field of fire can protect their own front; the flanks and rear of a line of guns are its most vulnerable parts.

2. Should the guns not be protected by the existing distribution of troops, special escort should be detailed, and if this has not been done it is the duty of the artillery commander concerned to apply to the commander of the nearest troops, who must provide an escort.

The duties of this escort will be:—

(i) To give timely warning of any threatened attack.

(ii) To keep hostile bodies beyond effective rifle range of the guns, or, in case of necessity, to cover the withdrawal of the guns.

3. All ground within rifle range which might afford concealment to an enemy should either be occupied by the escort or be under its effective fire.

The escort commander should place himself where he can best superintend his command, and ensure rapid communication between himself and the artillery commander.

The senior officer present, whether artillery commander or escort commander, will issue the necessary instructions to the escort.

But the escort commander must in either case have a free hand in carrying them out.

III. PROTECTION—VI. CONVOYS

CONVOYS

Field Service Regulations.—Pt. I, Cap. XI.

157.—General principles

1. The senior combatant officer with a convoy will command both the transport and its escort.

He will consult the senior transport officer on all matters which affect the welfare and convenience of the transport, will avoid all interference with his technical functions, and will give effect to his wishes unless, by so doing, the safety of the convoy would be endangered.

2. Commanders of fighting troops are responsible for the security of all supply units whose movements they regulate and will detail such escorts for them as the situation may demand.

The commander of line of communication defences is responsible for the security of supply columns, mechanical transport parks and convoys, which are controlled by the inspector-general of communications.

It will rarely be possible to provide for the security of fast-moving motor transport by means of escorts accompanying the transport. Usually, troops must be disposed so as to secure the roads by which the transport will move. The destruction even of small bridges may delay mechanical transport greatly, and special measures to protect them may be necessary.

The system of supply by mechanical transport is described in "F. S. Regs.," Part II.

3. Horsed convoys may be worked on any of the three following systems:

- i. Through convoys.
- ii. Staging system.
- iii. Meeting system.

i. The through convoy system consists in the same animals and vehicles being employed from the start of the convoy until its arrival at its destination.

ii. The staging system consists in the division of the road into stages, the same section of the transport working over the same ground, proceeding laden and returning empty.

iii. The meeting system is that by which two sections, one laden and the other unladen, meet daily at a fixed point between two stages, when loads are transferred or vehicles exchanged, each section returning to its respective stage.

The through convoy system is generally adopted in front of the advanced dépôt, and the staging or meeting systems on the lines of communications.

4. The success of an attack upon a convoy usually depends upon the defeat of the protecting troops. This will involve a combat, which will be governed by the principles already laid down in these regulations.

5. If convoys move frequently along a line of communication, the route should be piqueted daily by troops sent out from the posts on the line.

Should it be necessary to send a horsed convoy along a route which cannot be protected in this way, and is liable to attack, a special escort must be provided.

In civilized warfare the escort should not be distributed along the convoy but after small advanced and rear guards have been provided for the latter and sufficient men have been posted along it to ensure order and easy communication, the main portion of the escort should move with the usual precautions and in a handy formation on that flank of the convoy from which attack is anticipated.

6. The special business of the commander of a convoy is to conduct the convoy safely to its destination. Secrecy is most important. If fighting is inevitable, the enemy should be engaged as far from the convoy as possible.

7. Early information about the enemy and the roads ahead is essential, and the escort should be strong in mounted men or cyclists. Secrecy in movement being important, the escort and its scouts should be especially warned to avoid attracting the enemy's attention. If the enemy is near, **silence should be enforced** in the convoy itself.

8. If attacked, a convoy should not be halted and **parked** except as a last resource.

9. If the attitude of the drivers is doubtful, adequate police measures must be taken to prevent their deserting in the event of an attack.

10. Should the whole or part of a convoy be in danger of falling into the enemy's hands, it should be either destroyed or rendered unserviceable. The transport animals should at least be either carried off or killed.

IV. NIGHT OPERATIONS—I. Elementary Training

I.—ELEMENTARY TRAINING

Training in Night Operations.

I. T. Cap. 8.—Training in Field opens.—Sec. 113.

1. The chief object of this training is to accustom the soldier to moving in the dark, so that individuals and units can act with the same freedom by night as by day.

The instruction will be begun during recruit training and will be carried out progressively; it should culminate during the latter stages of company training and during battalion training in practice in the various methods of conducting night operations described in Field Service Regulations, Part I

The elementary work can be practised advantageously during winter afternoons and evenings.

The more advanced exercises should be carried out late at night or in the early morning.

2. The elementary training should consist in explanations followed by by practical work.

The following may be taken as a general guide as to the methods to be adopted, only the more elementary being used in the training of recruits:—

(i) **Visual training.**—One man of a section should march away and be stopped by voice or pre-arranged signal as soon as he is out of sight. He should call out the number of paces he has taken. The same man should then advance towards the section from some distance further off and be stopped as soon as he becomes visible, later counting his paces to the section.

It should be explained that:

(a) Ability to see in the dark increases with practice.

(b) Objects are more visible when the moon is behind the observer than when it is in front of him.

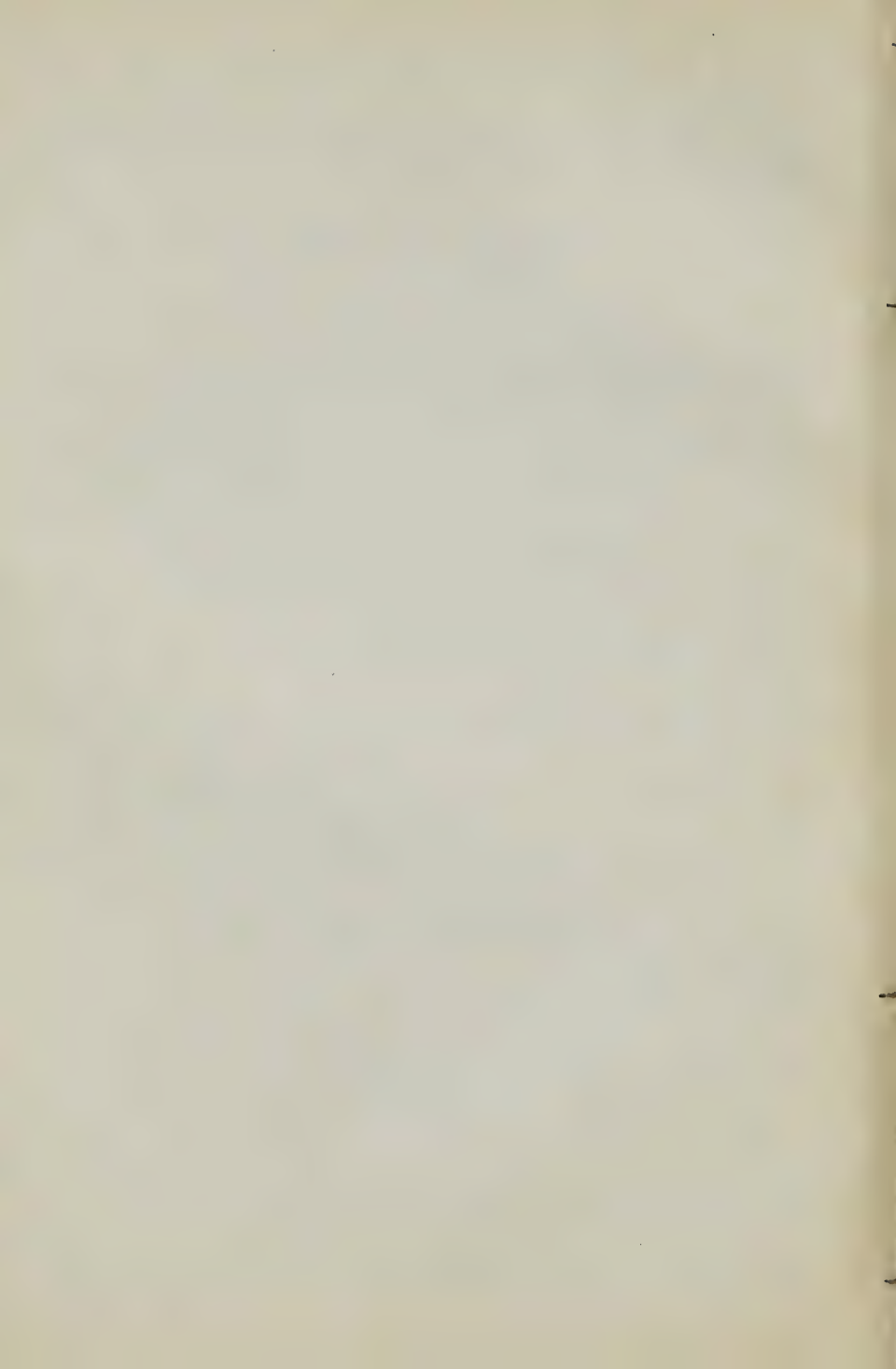
(c) An observer may stand up when he has a definite background and should lie down when he has not.

When the men have been practised in observing a man approaching at a walk they should be similarly practised in observing a man who is endeavouring to approach unseen.

(ii) **Training in hearing.**—Instruction will be carried out on similar lines to visual training.

At first the advance of a single man should be listened for, gradually the number should be increased so that facility may be acquired in judging the strength of a party approaching.

It is easier to hear sounds on soft ground when standing, on hard ground when lying flat.



Listening should be practised on various types of ground, e.g., open and enclosed country, across and in valleys, in woods, &c. The difference should be noted and explained.

(iii) **Silent advances.**—At first individual instruction should be given to men without arms, later the company should be taken out in marching order and should practise advancing noiselessly on roads, and in various formations over open ground, with whispered words of command. The following rule should be observed:—

- (a) When moving in short grass or on hard ground the toe should touch the ground first and the foot be raised higher than normally.
- (b) In long grass the pace should be slow and the heel be placed on the ground before the toe.
- (c) Precautions should be taken to prevent equipment rattling.
- (d) Arms must not be allowed to clash against those of other men, and must be placed noiselessly on the shoulder and ground in sloping and ordering arms.

(iv) **Training in orientation.**—The training should be individual and conducted by means of questions. Men should be able to distinguish the Pole Star (or in the Southern Hemisphere the Southern Cross) and should also be instructed in the identification by night of natural objects as guides to direction.

(v) **Night firing.**

(vi) **Training of night sentries.**

(vii) **Reconnaissance prior to night advances and attacks.**—At first the point marking the objective for the night attack should be either some conspicuous object or should be marked by a flag.

Men should not be allowed to approach nearer to the position than a point from which they might hope to avoid detection in daylight. From this point they should survey the line of approach to the objective by day.

After dark, men, working in pairs, should advance on the objective from the point from which the reconnaissance was made by day.

Men should be instructed in taking notes (written or mental) during the day reconnaissance, and should prior to the night work be questioned on the same.

As proficiency increases the same procedure should be adopted with less conspicuous objectives.

(viii) **Entrenching at night.**—How to carry entrenching tools without making a noise; the construction of various types of defences in the dark as silently as possible. (See Manual of Field Engineering.)

(ix) **Intercommunication and verbal messages** (see Sec. 96). Messages should be passed in a whisper from front to rear, or *vice versa*, the final message received being checked with the original, in order to detect faults

(x) **The system of protection on the march, and the best way of carrying it out in various types of country.**

NIGHT ADVANCES AND NIGHT ASSAULTS

Field Service Regulations.—Part I.—Cap. 9

Note specially in secs 136 and 137, Page 102, the different stages of formations:

- (a) Normal march formation.
- (b) Position of assembly.
- (c) Change to preparatory formation.
- (d) Position of deployment.
- (e) Fighting formation.
- (f) Point selected for attack.

NIGHT OPERATIONS

F. S. R., Pt. I.—Chap. IX

129.—General Principles

1. Night operations may be undertaken:—

- (a) To out manœuvre an enemy;
- (b) To avoid observation, particularly when the enemy is provided with aircraft;
- (c) To pass over an area of ground which it has been found difficult or impossible to traverse in daylight;
- (d) To continue or complete an attack begun before dark;
- (e) And to effect a tactical surprise.
- (f) Night marches may also be used to avoid the heat of the day.

Night operations may therefore be classified as:

- i. **night marches,**
- ii. **night advances,**
- iii. **night assaults.**

2. Surprise in some form is usually an object of night operations, secrecy of preparation is therefore important, but this should not be allowed to interfere with the **thoroughness and care** with which the **preliminary arrangements are made.**

Upon this care and thoroughness, and particularly upon the completeness of the **preliminary reconnaissance**, the success of night operations is (next to the special training of the troops to work in darkness,) chiefly dependent. Ample time must be allowed for the necessary preparations.

3. With the above proviso, night marches and night advances may be undertaken successfully by large bodies of troops.

Night assaults, that is to say, assaults delivered in the dark, should rarely be attempted by a force larger than an infantry brigade against a single objective unless the conditions are exceptionally favourable (Sec. 135.)

4. In all night operations the maintenance of connection is of the first importance.

It is the duty of every commander who furnishes connecting files to keep a reserve of these in his hands so as to supplement those already sent out whenever necessary.

130.—The reconnaissance

1. A thorough reconnaissance is an essential prelude to a night advance or to a night assault, and should rarely be dispensed with in the case of a night march.

Under exceptionally favourable conditions, e.g., when good roads, reliable guides, and good maps are available, a night march may be successfully carried out without this preliminary, but every commander who orders a night operation which is not preceded by a complete reconnaissance increases the risk of failure and incurs a heavy responsibility.

2. In a reconnaissance for a night march the route should be examined both by day and by night.

The best method of protecting the march of the column should be ascertained (Sec. 132, 3).

All points where checks are likely to occur, the position of branch roads or of places where the column might go astray and the best method of marking them should be noted (Sec. 132, 10).

The general compass direction of the march should be taken and should be mentioned in the operation orders.

It is often difficult for a column to know when it has reached its destination in the dark; this should be some easily recognizable landmark or should be marked in some prearranged manner; its appearance by night should be noted, and a description of it should be inserted in the operation orders, or, if it is desired to keep it secret, communicated confidentially to the commanders concerned.

3. In the case of a night advance or of a night assault, reconnaissance from a distance is insufficient. Information should be obtained as to:—

- i. The distribution of the enemy's forces as far as possible and the position of his outposts.
- ii. The nature and position of his entrenchments.
- iii. Whether there are any obstacles either natural or artificial which might hinder the advance.
- iv. The position of any landmarks which might assist the advance (Sec. 136.)

It will rarely be possible to obtain this information without fighting.

which will usually fall to the advanced troops and take place in daylight (Sec. 92.)

Subordinate commanders and regimental officers who are immediately responsible for the leading of the troops should carefully study the ground over which they will have to move, subject to such limitations as the commander of the force may impose.

When in proximity to the enemy, **advantage should be taken by all officers of pauses in the operations**, to gain knowledge of ground over which they may at any time be required to lead their men by night.

Selected scouts from the units to take part in the operation should usually be sent out in the direction of the proposed advance, to study the ground and to note the position of the enemy's outposts and of any defences or obstacles he may have erected. These scouts should assist in guiding their units in the subsequent advance.

131.—Night marches

1. A night march, with the exception of one undertaken because of the weather conditions, is either strategical or tactical; each is a valuable weapon in the hands of a skilful commander, who will use it to outwit, deceive, and surprise his enemy.

By a strategical night march an enemy may be outflanked or anticipated at an important strategical point, an army may be placed in such a position that the enemy is forced to accept battle under conditions unfavourable to himself, or a commander may extricate himself from an embarrassing situation.

By a tactical night march superior strength may be secretly concentrated at a decisive position, troops may be transferred unknown to the enemy from one point of a battlefield to another, or an inferior force engaged in delaying a superior force may avoid a decisive engagement (Sec. 114).

2. A tactical night march will usually be made under cover of outposts or advanced troops, either pushed forward at dusk or already in contact with the enemy, and will often culminate in an assault.

In the case of bodies of troops larger than an infantry brigade such an attack will usually be delivered at dawn or in daylight, and in the case of smaller bodies, the march will frequently be for the purpose of making a night attack.

Night assaults should, however, rarely be the sequel to a long night march, owing to the difficulty of obtaining definitive information as to the enemy's dispositions, and making the essential preparations from a distance.

When a night march is made for the purposes of an attack its immediate objective is the position of assembly (Sec. 136, 2), where the ordinary march formation is to be abandoned.

132.—General rules for night marches.

1. Local guides should be procured as a rule.

2. As secrecy is usually of the greatest importance the outposts should not be withdrawn till the last possible moment. They should be left in position till daylight, and should follow the column when convenient.

Bivouac fires should be left burning, and arrangements should be made for keeping them alight. Orders should be issued as late as possible, and all preparations be made quietly.

All horse and vehicles should be kept well in rear.

Precautions should be taken to prevent accoutrements and wheels of vehicles rattling.

Horses likely to neigh should be left with the train.

3. The march should generally be protected by small advanced and rear guards, which, except in the case of columns composed entirely of mounted troops, will consist of infantry.

In enclosed country, the flanks are best protected by piquets posted by the advanced guard and withdrawn by the rear guard (Sec. 144); in open country, either by piquets or by flanking patrols, but the latter, unless accustomed to night work, are liable to lose direction (see 8 below).

4. When a column is formed of all arms, mounted troops, artillery, and machine guns will usually march at the least exposed portion of the column (see 2 above).

If it is anticipated that obstacles may be met with, engineers with the necessary tools and materials for clearing the obstacles should accompany the advanced guard.

5. All ranks should be previously informed what they are to do in case of an alarm or attack.

6. Every commander should have a fixed place in the column, where he should remain. An orderly officer for the commander will be detailed from each unit to convey instructions.

7. The method of marking the starting point in the dark is described in Sec. 30, 3. "Starting point".

8. The regulation distances between units (Sec. 25) should be reduced or omitted, and the column must be kept closed up. An officer should invariably march in rear of each unit. Connection must be maintained throughout the column.

The distance of the advanced, flank, and rear guards from the column must be small, close connection being maintained by means of connecting files.

9. The march formations will be normal, unless tactical exigencies make a change necessary.

10. To prevent the troops in rear from going astray, the advanced guard, under instructions from the commander of the column, should block all branch roads that are not to be used by posting men at them, or by placing branches

of trees or lines of stones across them. These men will be withdrawn by the rear guard.

After crossing an obstacle or defile where opening out is likely to occur, the column should advance about its own length and then be halted until the rear is reported to be closed up.

Staff officers should be detailed by the commanders of the column to superintend this, wherever necessary.

11. Rifles should not be loaded, but magazines should be charged. No firing is to take place without orders.

Absolute silence must be maintained, and no smoking or lights are to be allowed, except with the permission of the commander of the force.

12. The hours and periods of halts should be arranged before starting. Units must not halt till they have regained any distances which they may have lost.

During halts men lay lie down, **but must not leave the ranks**; mounted men retaining hold of their horses.

13. The pace must be uniform. It is not safe to calculate on a force of the size of a division marching on a road faster than two miles an hour. The darker it is, the slower will be the pace.

133.—Guiding columns by night in open country.

The Service prismatic compass, Mark V, has a luminous dial for night work. For instructions for the use of instruments by night, see "Manual of Map Reading and Field Sketching."

1. (a) The route should be fixed by compass bearings;
- (b) The points where any change of direction is necessary should be noted;
- (c) the distances between these points should be clearly defined,
- (d) and, when practicable, the distances between easily recognizable points should also be measured.

2. The general direction can be effectively kept by means of stars. It is, therefore, important that an officer should acquire sufficient knowledge of the stars to enable him to ascertain his bearings by them (**see** "Manual of Map Reading and Field Sketching").

3. An officer, other than the one guiding the column, should invariably be detailed to check the distance marched.

4. When troops are in column, distances from front to rear may be best preserved by means of knotted ropes; intervals by the extension of men (Sec. 129, 4).

134.—Night advances

1. **The purpose of a night advance is to gain ground from which further progress will be made in daylight and not to deliver a decisive assault during darkness.**

Night advances are usually of two kinds.

They may be used as a preliminary to opening a battle or to continue an engagement already begun, with improved prospects of success. In either

case the protective cavalry or outposts will usually be in contact with the enemy.

A night advance is a forward movement by a force which is deployed: it may be the sequel to a night march, but more usually the advance is made with the force deployed from the outset.

The advance is generally followed by an attack at or soon after dawn, and is undertaken either with the object of surprising the enemy or of gaining ground which could only be covered in daylight under conditions unfavourable to the attacker.

2. A night advance during a battle may be made when it had not been found possible to gain a sufficient superiority of fire during daylight to justify an assault, for the purpose of renewing the fight under more favourable conditions at dawn.

Night advances of this nature will often be advantageous against a strongly posted enemy who offers such stubborn resistance as to cause the operations to extend over a period of more than one day.

The objective of the advance when gained should be entrenched so that it may afford a point of support to further progress in daylight.

Occasionally it may happen that an enemy has occupied a position which leaves the assailant little or no scope for manœuvre and has been strengthened to such an extent as to make the success of an attack in daylight doubtful.

Under these circumstances a series of advances on successive nights, from one fire position to another, may be advisable, each advance being for a few hundred yards only and each position when gained being entrenched.

Such operations approximate to siege warfare and should rarely be necessary or advisable in field warfare except in country where freedom of manœuvre is very limited.

When the ground in the vicinity of the objective of a night advance is likely to be difficult to entrench, the troops should carry empty sand bags, which can be quickly filled and placed in position in darkness.

135.—Night assaults

1. Assaults delivered during darkness may be undertaken in order to

(a) Gain a point of support for further operations in daylight.

(b) To drive in an enemy's advanced troops.

(c) To secure an outpost position as a preliminary to an attack at dawn.

(d) Or to surprise an ill-trained, ill-disciplined or semi-civilized enemy.

Though such assaults should rarely be attempted by a force larger than an infantry brigade against one objective, in the case of a force deployed on an extended front several distinct objectives may be attacked simultaneously with advantage.

As in the case of a night advance the attackers should at once entrench the positions they secure.

It may be anticipated that the enemy will attempt to regain what he has lost, usually by a counter-attack at dawn.

It is therefore advisable to time the delivery of the assault so that the attackers may have two or three hours of darkness in which to prepare and organize their defence.

When one or more night assaults are delivered by part of a force, the remainder should always be in readiness to take advantage at daylight of any success obtained during darkness.

2. Night assaults may not infrequently be forced on an assailant by the fact that the conditions of the fire fight have been or are certain to be adverse.

Circumstances may prevent the successful co-operation of the attacker's artillery, or it may be important to neutralize the effect of the defender's artillery.

A night assault may then be justified as the only possible solution of a difficult situation, but when the **conditions of the fire fight are likely to be favourable it will probably be better to accept the inevitable casualties that must result from a struggle for fire supremacy in preference to the undoubted hazards of a night assault.**

PREPARATIONS FOR NIGHT ADVANCES AND NIGHT ASSAULTS

136.—Preliminary measures

1. The preliminary measures necessary both for night advances and for night assaults are similar and may be considered together. (For the reconnaissance **see** Sec. 130.)

2. When a movement in march formation precedes a night advance or a night assault (Sec. 131, 2), a **position of assembly** must be selected beforehand, where the normal march formation is to be abandoned (Sec. 25).

The distance of the position of assembly from the objective depends :

- (a) On the nature of the country.
- (b) the enemy's vigilance.
- (c) the possibilities of discovery
- (d) and the size and composition of the attacking force.

3. It is also necessary to decide beforehand the place where the columns are to deploy for attack.

This place is termed the **position of deployment**.

It must be so situated that the force, while there, is secure from interruption.

It will frequently be possible to push forward outposts at dusk or during light to within a comparatively short distance of the objective of a night advance and to deploy under their protection.

In certain circumstances, **e.g.**, in very open and level country, or when the opposing forces are in close touch, the position of deployment may coincide with the position of assembly.

4. Both the position of assembly and the position of deployment should be easy to recognize at night.

From the former position to the latter, and from it again to the **points selected for attack**, compass bearings should be carefully taken and noted.

The distances between these points must also be ascertained as accurately as circumstances admit.

5. If two or more points are to be assaulted simultaneously, care must be taken, in selecting the positions of assembly and the positions of deployment, that the various forces advancing from them will not converge towards one another to such an extent that there is a danger of their meeting or crossing one another.

6. A distinguishing mark should be ordered for the troops, and a watch-word decided on. The commander of the force and his staff should wear easily distinguishable badges.

7. The materials necessary for surmounting or cutting through obstacles, and for entrenching the position when captured, must be arranged for.

8. Rockets, flares, or bonfires may usefully be employed as the signal for assault.

137.—Composition and formation of columns

1. The troops employed for night advances or night assaults should as a rule be infantry, with the addition of engineers to assist in the maintenance of communication, in removing obstacles, and in preparing the objective for defence.

2. Artillery can rarely be of assistance during the hours of darkness, and in the case of a night attack may prove a serious danger to its own troops if thorough preparations have not been made in daylight.

If the operations are protracted, the positions of the artillery have been previously taken up, and the ranges of the objectives are known, guns may occasionally be able to assist an attack upon a strongly entrenched position.

In this case careful arrangements are necessary to ensure the cessation of artillery fire when the infantry are close to their objective.

Artillery may often be moved with advantage into positions, which can be entrenched during darkness, whence it can support an attack in daylight.

3. At the position of assembly, **the normal march formation** will usually be changed for a **preparatory formation** which will bring the force more directley, under its commander's control, and from which deployment for attack will be easy.

It is important that the formation adopted should facilitate the guidance of the troops across country.

4. Lines of scouts, at about 80 yards in advance and on the flanks of the column, usually afford the best protection to troops advancing across open country in a preparatory formation.

5. It is not safe to count on troops moving in a preparatory formation faster than one mile an hour.

6. At the position of deployment the formation will be adopted in which the remainder of the advance is to be made. It is an advantage if the force can move from the first in this formation, but when troops advance for long in **fighting formations** by night control is more difficult and the fatigue caused to the troops is increased.

7. The formations to be adopted must vary with the ground and with the special circumstances of each case. The following formations have proved suitable:

The force may be divided into three lines.

The first line, which should be preceded at from 50 to 80 yards **by a line of scouts**, may move in line, or in line of columns of platoons at deploying interval; in the latter case lateral connection should be maintained by connecting files at about 10 paces interval (Sec. 129, 4.)

The second line may move in similar formation to the first at about 100 to 150 yards distance.

The third line should follow at about 200 yards distance in mass, line of mass, line of masses, or any other convenient close formation.

The second and third lines may conveniently move on one or both flanks of the first line, so as to avoid fire suddenly directed at the latter.

The role of the second line is to act as an immediate support to the first

And of the third to serve as a reserve; Any tools or special appliances required to place the objective in a state of defence should accompany the latter

The above formations are intended as a general guide, the only rule to be followed is that the formation chosen must be adapted to the particular case.

When an advance or an assault is made simultaneously against several distinct objectives, a general reserve to the whole should be detailed.

138.—The advance

1. **Before the troops move off from the position of assembly it is essential that the orders should be clearly explained to all ranks, so that every one may know:—**

- i. The object in view and direction of the objective.
- ii. The formation to be adopted at the position of deployment.
- iii. The part he has to play.
- iv. His action in case the enemy is not surprised.

2. **The following instructions should be repeated two or three times to the men by the company officers:—**

- i. Rifles should not be loaded, magazines should be charged and cut-offs closed, and no one is to fire without a distinct order.
- ii. Until daylight, bayonets only are to be used.
- iii. Absolute silence is to be maintained until the moment of assault.

The troops will march as quietly as possible. Accoutrements must not be allowed to rattle.

iv. No smoking is to be allowed, nor matches to be struck.

v. If obstacles are encountered which cannot be readily traversed or removed, the troops will lie down till a passage has been cleared.

3. The maintenance of lateral communication between different columns must be arranged so that the assaults may be delivered simultaneously.

Communication between columns, and with the general reserve, is best secured by telephone.

Visual signalling is very unreliable shortly before and after dawn.

4. The force should occasionally be halted for a short time, to enable the formation to be corrected.

5. If hostile patrols, scouts, or advanced parties are encountered, they must be captured without noise. They must be rushed in silence with the bayonet without hesitation.

6. If, after the position of deployment has been left, the enemy opens fire, all ranks should understand that it is their duty to press forward at once, cost what it may.

No movement to the rear should be permitted, even to correct mistakes which may have been made, so long as it is intended to continue the advance.

When two forces are in close contact it will rarely be possible to surprise a civilized and disciplined enemy completely. Night assaults must, therefore, be prepared to receive fire before closing with the enemy.

7. If an assault at dawn succeeds, the mounted troops should push forward with all speed and endeavour to get round the flank of the retreating foe.

If it fails, they will do their utmost to protect the retiring infantry while the artillery takes up a rallying position.

139.—Orders for night assaults and for night advances.

1. In framing orders for night operations it may be necessary to deal with the following points in addition to those considered in Secs. 12 and 104, 2:—

i. Time of assembly at, and departure from, the position of assembly.
Description of the position of assembly.

ii. Order of march, and formations on leaving the position of assembly.
Distances and intervals, Maintenance of communication.

iii. The bearing of the route.

iv. Time and duration of halts.

v. If possible, the position of deployment should be described, and its distance from the position of assembly and from the point selected for attack notified.

vi. Formation to be adopted at the position of deployment.

vii. Special instruction for the assault, and the signal for it (Sec. 136, 8).

viii. Short description of the ground to be crossed.

- ix. Description of the position to be assaulted.
- x. Conduct of troops during the advance (Sec. 138, 2).
- xi. Action in case the enemy opens fire.
- xii. Action after the position is captured to resist counter-attack.
- xiii. Extent to which the captured position is to be fortified and the detail of troops who are to perform this duty.
- xiv. Action of reserves or neighbouring troops against positions likely to enfilade the captured position.
- xv. Distinctive marks and watchword.
- xvi. Place of the commander at the position of assembly, during the march thence, and at the position of deployment.

2. Orders will usually be communicated beforehand to those officers only from whom action is required, so that timely arrangements may be made.

Until the troops reach the position of assembly, no more should be made known to them than is absolutely necessary.

It may be advisable, in order to deceive spies, that misleading orders should be given out.

140:—The Defence

The general principles of defence by night differ little from those of defence by day, except that a decisive counter-attack should rarely be attempted outside the limits of the position, since its direction must depend upon the enemy's movements and it cannot therefore be prearranged in daylight.

When, however, an enemy has succeeded in establishing himself in the position at night he **should be attacked as soon and in as great strength as possible.**

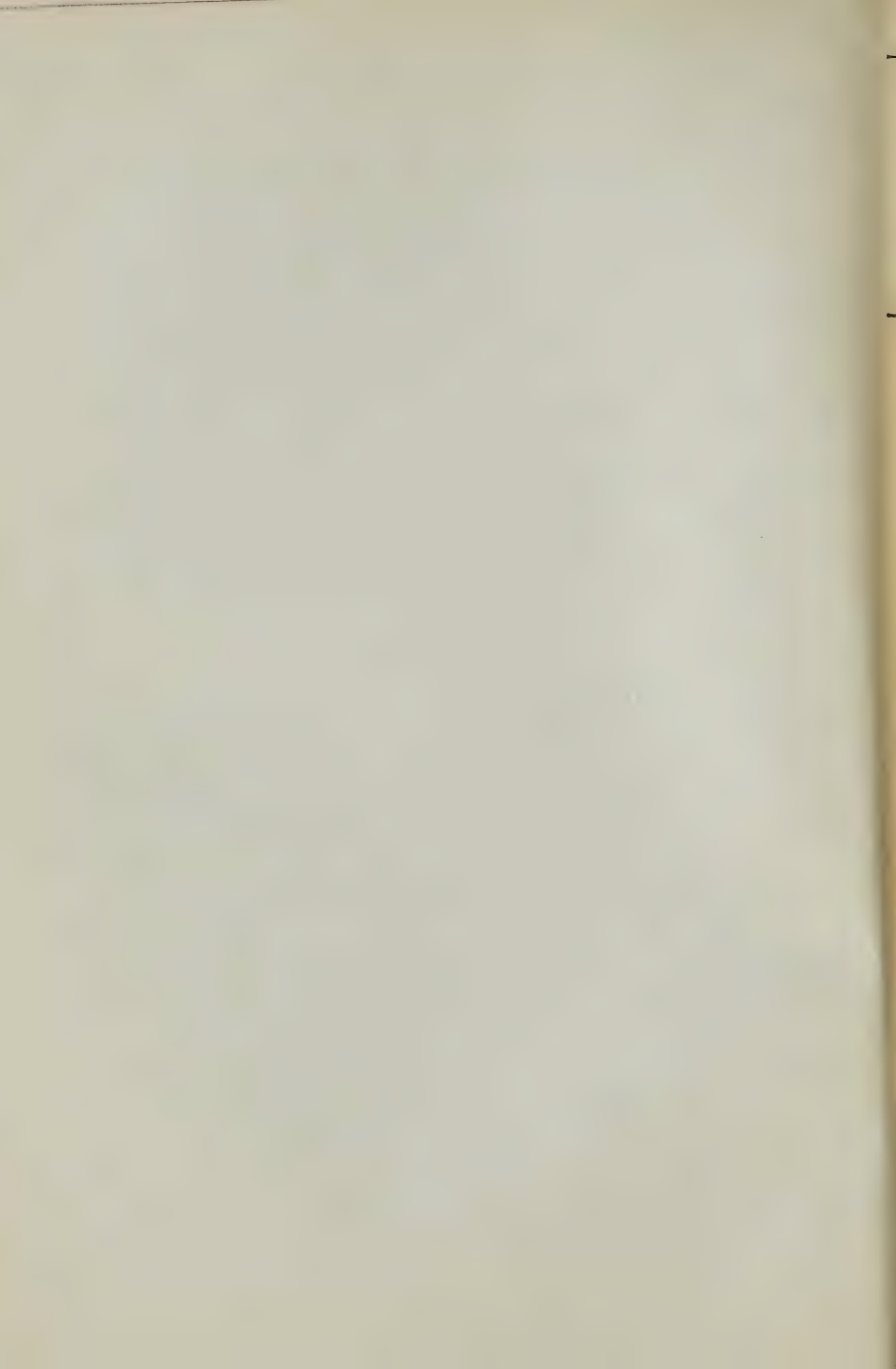
Artillery may assist the defence effectively when the front to be defended is narrow, and there is limited ground over which the enemy must pass if he wishes to attack.

Under these circumstances field search lights will be of value. Search lights should not usually be exposed until the attacking force is reported by the outposts or patrols to be advancing to the attack; otherwise they betray the position and serve to guide the attacker.

Those search lights intended especially to assist the artillery should be under the orders of the artillery commander, and should be at least 400 yards on the flank of the artillery whose target they are to illuminate.

All search lights should be well entrenched, usually low down on the forward slope of the position.

The whole area of the front should be illuminated by beams directed from the flanks across the front of the position, or when the hilly and broken nature of the ground makes this impossible, by a large number of small lights with dispersed beams at close interval.



V. MISCELLANEOUS—I. Knotting & Lashing

I.—KNOTTING & LASHING

(Manual of Field Engineering, Cap. 10)

(See also Military Engineering, Pt. III.)

69.—Knots.

1. The following are the most useful knots and their principal uses:—

- (a) To make a stop on a rope, or to prevent the end from unfraying, or to prevent its slipping through a block; the **thumb knot** (Pl. 39, Fig. 1) or the figure of 8 (Fig. 2).
- (b) To **bend** or join two ropes together. The **reef knot** (Fig. 3) for dry ropes of the same size; the **single sheet bend** (Fig. 4) for dry ropes of different sizes; the **double sheet bend** (Fig. 5) for great security or for wet ropes of different sizes, and the **hawser bend** (Fig. 6) for joining large cables.
- (c) To form a loop or **bight** on a rope which will not slip. The **bowline** (Figs. 7 and 8) for the loop at the end of a rope, the **bowline on a bight** (Fig. 9) for a loop in the middle, with a double of the rope. The loop formed by passing the running end through a bowline loop at the end of a rope is called a **running bowline**.
- (d) To secure the ends of ropes to spars, pickets, &c., or to other ropes (Pl. 40).
 - Clove hitch** (Figs. 1 and 2) (two half hitches), generally used for the commencement and finish of lashings.
 - Timber hitch** (Fig. 3), for holding timber, &c., where the weight will keep the hitch taut.
 - Two half hitches** (Fig. 4), for making fast the running end of a rope on to its standing part.
 - Round turn and two half hitches (or rolling bend)** (Fig. 5), for **belaying** (or making fast) a rope so that the strain on the rope shall not jam the hitches. This will be used for making fast a rope to a bollard or anchorage. Should the running end be inconveniently long, a bight of it should be used to form the half hitches.
 - Fishermen's bend** (Fig. 6), for making fast when there is a give-and-take motion, e.g., for bending a cable to an anchor (Pl. 56, Fig. 1).

- (e) To fix a spar or stick across a rope (Pl. 40).

Lever hitch (Fig. 7), for drawing pickets by a lever and fulcrum, fixing the rounds of a rope ladder, fixing bars to dragropes, &c.

- (f) To form a loop on a dragrope.

Man harness hitch (Figs. 7 and 8), the loop being of a size to pass over a man's shoulder.

- (g) To secure a headrope, boat's painter, &c., to a post, ring, or rope, so that it can be instantly released (Pl. 41, Figs. 1, 2 and 3). **Draw hitch**, made as follows:—Pass a bight of the running end (**a** Fig. 1, round the holdfast; pass a bight of the standing part (**b** Fig. 2) through bight **a**, and haul taut on the running end; pass a bight of the running end (**c** Fig. 3) through bight **b** and haul taut on the standing part. This knot will stand a give-and take motion and can be instantly released by a jerk on the running end.

- (h) To fix a rope with a weight on it rapidly to a block.

Catspaw in the middle of a rope (Fig. 5), for hooking on a block.

- (k) To transfer the strain on one rope to another.

Stopper hitch (Fig. 4), for use on occasions when it is necessary to shift the strain of a rope temporarily.

70.—Slings

1. To sling a cask horizontally. Make a long bight with a bowline and apply as shown in Pl. 41, Fig. 6.

2. To sling a cask vertically (Fig. 7). Place the cask in a bight at the end of the rope, and with the running end make a thumb knot round the standing part of the rope. Open out the thumb knot and slip it down the sides of the cask. Secure with a bowline.

71.—Lashings.

1. A rack lashing consists of a length of $1\frac{1}{2}$ inch rope, with a pointed stick at one end. It is used for fastening down ribands at the edge of the roadway of bridges. It is commenced with a thumb knot at **a** (Pl. 42, Fig. 1), the end twisted in the bight. The stick is then put into the bight, twisted against the hands of the clock till all is taut (Fig. 2), and finally jammed in from right to left between the lashing and the outside of the riband (Pl. 51, Fig. 1).

2. To lash one spar square across another, commence by a clove hitch on spar **a** below **b** (Pl. 42, Fig. 4) and twist the ends together, carry at least four times round the spars, as shown in figure, keeping outside previous turns on one spar and inside on the other, two or more frapping or cross turns are then taken, the corners of the lashings being well "beaten in" during the process. and finished off with two half hitches round the most convenient spar

3. When the spars are the leg and transom of a trestle or frame, the clove

hitches should be on the leg below the transom and the lashings should be finished off on the transom outside the leg. When the spars are leg and ledger the clove hitch should be on the leg above the ledger.

To lash two spars together that tend to spring apart. Begin with a timber hitch or running bowline round both spars and draw them together, then take three or four turns across each fork and finish with frapping turns and two half hitches (Fig. 5). When the spars are not horizontal, the lashing should be finished off above the junction.

4. Wedges with well rounded points are often useful for tightening lashings. They are generally used by builders in scaffolding, and should be driven in at the top of the lashings.

5. Kemp-rope lashings soon become loose, and require frequent re-making. Wire lashings should be used in their place when possible. These can be made in a similar way to hemp-rope lashings; but, unless staples are available, the wire should be finished off round a set of returns, and jammed between them and the timber. It is of little use attempting to finish off on a round spar. No. 14 gauge steel wire may be taken to have $\frac{1}{4}$ the strength of 2" cordage.

6. To lash a block to a spar.—The back of the hook is laid against the spar, a clove hitch is taken round the spar above the hook, then several turns round the hook and spar, and finished off with two half hitches round the spar below the hook. (Pl. 42, Fig. 6.)

7. The hook of a block is moused by taking some turns round it with spun yarn of very light lashing, commencing with a clove hitch on the back of the hook and finishing off with one or two frapping turns and a reef knot (Pl. 43, Fig. 1.). (See also G. A. T., Vol. III, Sec. 4.)

8. The end of a rope is **seized** to the standing part with spun yarn or string, by forming a clove hitch round one of the ropes with the spun yarn near its centre, taking each part round both ropes in opposite directions, leaving one end long enough to take two frapping turns between the ropes, and connecting the two ends with a reef knot. (Pl. 41, Fig. 4.)

72.—Holdfasts.

(See also Military Engineering, Pt. III, and G. A. T., Vol. III, Chap. 3.)

1. A picket used as a holdfast may be driven into the ground at right angles to the direction of the strain. If the latter is great, three or more pickets can be driven in a cluster to form a bollard.

2. If a large piece of timber is used as a bollard, its corners must be rounded off. Pl. 42, Fig. 7, shows a method of using a buried log for large strains. A trench having been dug long enough to hold the log, the cable is given one complete turn around it and passed up through a narrow incline constructed at right angles to the trench. The running end is then seized to the standing part in two or three places.

3. A 3. 2. 1. holdfast made of 5 feet pickets, driven 2 feet 6 inches to 3 feet in the ground, should stand a strain of 2 tons. (Pl. 42, Fig. 3.)

73.—Strength and size of Cordage, Etc.

1. The size of a rope is denoted by its circumference in inches, and its length is given in fathoms. (A fathom is 6 feet.) Cordage is usually issued in coils of 113 fathoms, and steel wire ropes in coils of 100 fathoms.

2. For field purposes, the safe working load for all cordage has been laid down as C2 cwts., while for steel wire rope, it may be taken as 9 C2 cwts. where C is the circumference in inches. Steel wire rope may be taken as twice as strong as iron wire rope.

3. The strength of wire varies greatly; as a very rough rule it may be taken that the breaking weight in pounds equals three times the weight per mile in pounds. (See Appendix III, Table 14.) This rule holds good for iron and hard drawn copper wire, while steel wire may be taken as about twice as strong.

4. The strength of a lashing around two objects may be taken as $\frac{4}{5}$ of the number of times the lashing passes from one object to the other multiplied by the unit strength of the lashing, e.g., a square lashing with four turns has a holding power of $\frac{4}{5} \times 16 \times$ strength of lashing; in the case of a hook lashed to a spar with four turns it is $\frac{4}{5} \times 8 \times$ strength of lashing.

When using wire in lashings, multiply by $\frac{3}{4}$ instead of $\frac{4}{5}$.

CHAPTER XI.—BLOCKS, TACKLES AND USE OF SPARS.

(See also Military Engineering, Pt. III.)

74.—Blocks.

(See also G. A. T., Vol. III, Sec. 60.)

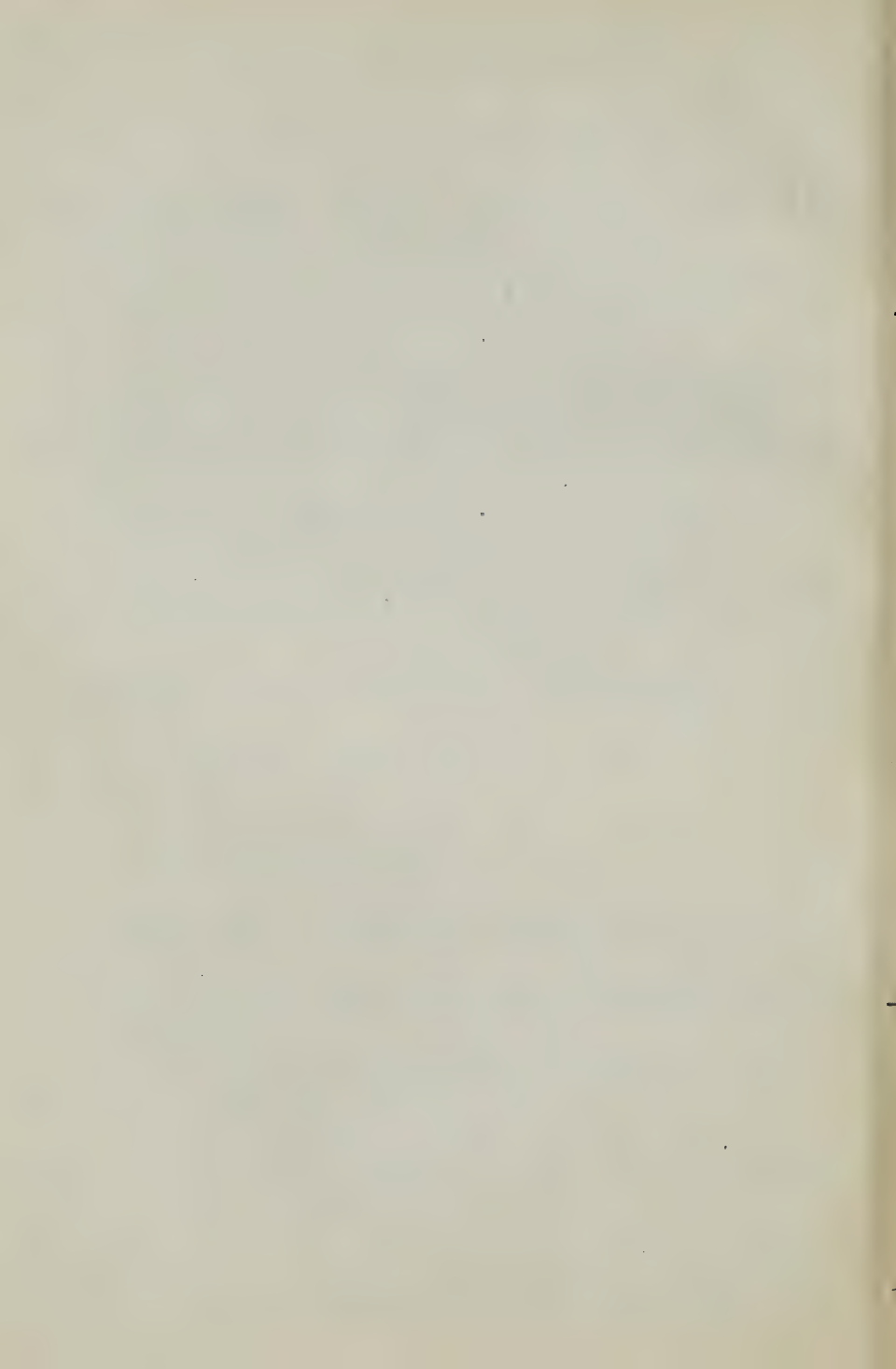
1. Blocks are used for the purpose of changing the direction of ropes or of gaining power.

They are called single, double, treble, &c., according to the number of sheaves which they contain. The sheaves revolve on a pin, which should be kept well lubricated,

Snatch blocks (Pl. 43, Fig. 1) are single blocks with an opening in one side of the shell, to admit a rope without passing its end through. This opening is closed by a hinged strap.

2. The rope with which tackles are **rove** is called a **fall**. To **overhaul** is to separate the blocks. To **round in** is to bring them closer together. When brought together the blocks are said to be **chock**.

3. A tackle is rove by two men, back to back, 6 feet apart; the blocks should be on their sides between the men's feet, hooks to the front, and the coil of rope to the right of the block at which there are to be the greater number of returns. Beginning with the lower sheal of this block, the end of the



fall which is to be the standing end is passed successively through the sheals from right to left and then made fast.

4. In using tackle great care must be taken to prevent it from twisting. The best method is to place a handspike between the returns, close to the movable block, with a rope to each end, by means of which it can be steadied. New rope must be uncoiled and stretched before using it as a "fall".

Crane chain, when used as a fall, should be thoroughly soaked in oil.

75.—Tackles.

(See also G. A. T., Vol. III, Chap. 7.)

1. Various tackles are shown in Pl. 43.

Theoretically, in any system of two blocks the power required to raise a weight W is $W \div$ number of returns at the movable block. Owing to friction 10 per cent must be added to the power for each sheaf used.

If P be the power required to raise a weight W , G the number of returns at the movable block, and N the total number of sheaves; then

$$P = \frac{W}{G} + \left(\frac{N}{10} \times \frac{W}{G} \right)$$

2. The fall, in lifting heavy weights, can rarely be worked by hand, but has to be "led" to either a capstan or winch, by which power is gained and a steady pull ensured.

3. In using tackles with shears, gyns, or derricks, the running end of the fall should always be led through a "leading block", lashed, as a rule, to one of the spars a few feet above the ground; a snatch block is most convenient for the purpose. (Pl 44, Figs. 4 and 5.)

V. MISCELLANEOUS.—II. BRIDGING.

2.—BRIDGING

(Manual of Field Engineering, Cap. 13, sections 79 to 84.)

(See also F. S. Regs., Pt. I, Sec. 32, and Military Engineering, Pt. III.)

(For materials and stores, see Appendix III, Tables 5, 6, 9, 12 and 14.)

79.—General Instructions.

1. Tactical requirements will usually determine the locality for a military bridge, but when choosing the exact site attention should be paid to the nature of the banks and approaches, the nature of the bed, width to be bridged,

depth of water, strength of current, and the probability and extent of floods, all of which are important from a technical point of view. If a tidal river, the rise and fall of the tide should be ascertained.

2. The approaches at both ends of a bridge are a matter of great importance. Easy access and a difficult exit are liable to cause crowding at the entrance to, and on, a bridge, which may lead to accidents and delay.

The passage of troops **off** a bridge should always be expedited, while their passage **on** to it should be carefully regulated and, when necessary, checked by material obstacles.

3. Marshy banks should be avoided, and if ramps are required the gradients should be easy. (See Sec. 78.)

4. River bends are not, as a rule, good positions for military bridges as the current runs unevenly, the depth varies, and the bank on the outside of the bend is often precipitous, while that on the inside might be marshy.

Thus, in Pl. 46, Fig. 1, the depth will probably be above the average near C and F, and there will be shallow pits at D and E.

For this reason a river which is not anywhere fordable straight across may be found passable in a slanting direction between two bends, as at A B, Fig. 1, through shoal water.

5. All fords should be clearly marked by strong pickets driven into the river bed above and below the ford, their heads being connected by a strong rope which is securely anchored to holdfasts at each shore end. Marks should be made on these pickets which stand in the deepest water, at a height of 3 feet and 4 feet above the bottom, in order that any rise of water above the fordable depth may be at once evident.

6. The simplets plan for measuring the velocity of a stream is described in Sec. 61 (2). Seven-tenths the mean number of feet a second gives the number of miles an hour, in which terms the velocity should be stated.

80.—Bridging Expedients.

1. For tactical reasons it is usually important to pass men, and often horses and artillery, across water at the earliest possible moment, and, in the absence of a bridging train, some expedient, more rapidly executed than the construction of a bridge for all arms, must precede work of a more deliberate nature.

2. It will frequently happen also that materials for the construction of a bridge will be lacking in whole or part. In such a case the means of crossing a river must be improvised from the materials likely to be found near at hand or which are usually carried by the troops. A few of these bridging expedients are given below:—

(i) In shallow water, carts or wagons may be used to form the substructure for a bridge.

(ii) Small gaps may be filled up with bundles of brushwood, channels being left for the passage of the water.

(iii) Rafts or even piers for bridges may be made of waterproof material such as tarpaulins, ground-sheets, &c., stuffed with hay, straw, heather, ferns, &c.

A raft consisting of four 18 foot by 15 foot tarpaulins (*see* App. III, Table II) stuffed with hay will carry a G. S. wagon, 18 pr. field gun without limber, or equivalent load not exceeding 24 cwt. The best method of filling each tarpaulin is to make a light framework of poles, 6 feet square by 2 feet 6 inches high, on the ground (a hole of similar dimensions will do almost as well). Then place two lashings about 24 feet long across the framework each way, and over these the tarpaulin, well soaked. Fill the tarpaulin with hay and trample it well down. The ends and sides of the tarpaulin are then folded over the hay, and the whole made into a compact bundle by securing the lashings across the top. (Pl. 47, Fig. 1.)

Two of these floats are then lashed together by means of two 14 ft. spars. This forms half the raft. The other half is made in a similar manner. The two halves are then lashed to one another, and 3 ft. apart, by means of four 16 ft. roadbearers. The raft will then measure 15 ft, by 12 ft. by 3 ft. 6 ins. In such a raft the buoyancy is greatly in excess of that actually required to carry the load, but this is necessary owing to the kind of material employed and the short length of the piers. With good tarpaulins the buoyancy will remain good for at least 8 hours.

The stores required are:—

Tarpaulins.....	4
Hay (tons).....	1½
Planks.....	16
Spars (average 4" diam.), four 16', four 14' and two 12'.....	10
Lashings, 1", about 3 fms. long.....	40
do 1", about 6 fms. long.....	16
Ropes, 2", length according to width of river.....	2
Punting poles.....	2

Smaller rafts can similarly be made by stuffing ground-sheets with hay or straw. 24 of these made into a raft will support a load of 1,800 lbs. (Pl. 47, Figs. 3 and 4.)

(iv) A rough boat can be made by covering the body of the mark IX G. S. wagon with its tarpaulin cover. Any projecting points of the wagon must be covered with hay to protect the tarpaulin, and any holes in the wagon should be filled the same way. The tarpaulin must be kept close to the wagon body by lashings. If sufficient lashings are available, one should be tied right-round the wagon two-thirds of the way back from the front, while a second should be lashed round the wagon half way up its side, passing through the eyelet holes in the cover. 4 to 6 men may be carried sitting down in the boat.

Rough boats may be made in a similar way by fastening tarpaulins over a brushwood framework.

(v) When casks are obtainable in small numbers only, light foot-bridges may be made in various ways.

A bridge of this description with a double footway, suitable for infantry, can be quickly constructed as shown on Pls. 49 and 50.

The stores required for each raft or 18 ft. of bridge are:—

Casks 54 gallons.....	4
Gunnel spars, 15 ft. long, about 3 ins. diameter ..	4
Tie-baulks, .. do ..	4
Planks, 10 feet long.....	8
Lashings, 2 ins., 9 fms.....	8
ditto 1 ½ ins. 6 fms	4

This bridge will bear infantry in single file at intervals of 4 feet on both footways at the same time. As the footways are at the ends of the piers, the bridge is suitable for swimming animals alongside. (Pl. 50, Fig.1.)

(vi) A raft which will carry two armed men can be made from a single 54 gallon cask, as shown in Plate 48, Fig. 3.

81.—Tackle for Swimming Horses.

A method of swimming horses across a river where no bridge exists is by means of an endless rope.

If possible, a place should be selected where the banks shelve and the bottom is hard on each side of the river: this is most essential for the landing side.

The materials required are a two-inch rope (endless), the minimum length of which should be equal to twice the width of the river plus about 70 yards; pickets for holdfasts, four snatch blocks and a tackle.

A party of 1 officer and 35 men are sent across the river with two snatch blocks, the tackle, pickets for 2 holdfasts and a bight of the endless rope. This is arranged as shown on Pl. 46, Fig. 2. 10 to 15 men are required on the starting side to work the rope and four men as lashers. Each horse having been stripped except for head collar and head rope, is fastened by one of the lashers, walking backwards, to the endless rope on the down stream side by means of a draw hitch (Pl. 41, Fig. 3), made with the head rope, the length of which must not exceed 18 inches when the horse has been secured. The horses should be tied on at intervals of 3 to 4 horse lengths (8-10 yards), and care must be taken that the head rope is tight on the endless rope. On the landing side 25 men will be required to pull on the rope, which they should do hand over hand and as quickly as possible. Four men with clasp knives receive the horses, and must be ready to cut any head rope knot that jams. Six men take the horses from the receivers and lead them away.

If snatch blocks are not available more men will be needed, the horses

should only be sent across two or three at a time, and a spliced rope is not essential.

(For making a **long splice**, see G. A. T., Vol. III.)

82.—Types of Bridges.

1. Where the tactical situation demands better facilities for the passage of water or ravines than those existing or above described, and time, materials, and labour are available, some form of bridge may be required.

The type of bridge will vary according to the materials available, the traffic expected and the nature, breadth, depth, &c., of the span to be bridged; but **whatever arm of the service a bridge is constructed to carry, it should be capable of carrying that arm when crowded.**

A bridge that will carry infantry in fours crowded will carry field guns and 5-inch howitzers and most of the ordinary wagons that accompany an army in the field.

2. The officer superintending the construction of a bridge is responsible that it is strong enough to support the weight it is intended to carry. To prevent it being improperly used, and in addition to the measures prescribed in F. S. Regns., Pt. I, Sec. 32, he should place a signboard at each end, stating the greatest permissible load, thus:—

“Bridge to carry infantry in fours.”

“Bridge to carry infantry in file.”

“Bridge to carry guns not heavier than 18-pr.”

“Not for animals.”

“Bridge for All Arms. No road engines.”

The simplest form of construction consists of round spars lashed together with rope or wire, but sawn timbers, as used in the construction of buildings, and iron fastenings, are often more easily obtained than spars and rope. Iron fastenings necessitate a few carpenter's tools, but are more satisfactory than lashings.

The **length** of bays depends chiefly upon the strength and length of the materials available as roadbearers. When the piers are high, or involve much time in construction, material and labour should be economized by making the bays as long as possible.

The **number** of roadbearers also depends upon the size of the timber available. (See Section 95.)

3. When the bottom can be reached throughout, a trestle bridge (Pl., 51, Fig. 5), or some form akin to it, will generally be the most economical in material and the easiest to make. When the bottom cannot be reached small spans may be bridged by laying timber straight across the gap, or by using such forms of bridge as the single lock, the double lock and the cantilever. Where material is available and depth of water and current are suitable, a floating bridge will be the quickest and simplest form of bridge to employ.

83.—Roadways.

1. The same nature of roadway can be applied to each type of bridge, and its usual form is shown in Pl. 51, Fig. 1.

The planks or **chesses**, A, A, placed across the width of roadway are supported on longitudinal **baulks** or **roadbearers**, B, B, which in their turn rest on transverse **transoms**, T, T. The method of supporting these transoms depends on the type of bridge. The chesses are kept steady by **ribands**, R, R, which are secured to the outside baulks either by **rack lashings** or by lacing, or the chesses may be nailed down.

2. The roadway is generally constructed with a slight rise towards the centre of the bridge to get loads on to the bridge quietly and off it easily; this is technically called the **camber**, and should be about 1-60 of the span for bridges up to 40 feet in length. For longer bridges camber at a slope of 1-30 for the bays next the banks is sufficient. In soft ground an extra allowance for subsequent settlement should be made.

3. The "normal" width of bridge is 9 feet **in the clear**—i.e., the clear space between the ribands. As a rule this should not be exceeded. A width of 8 feet in the clear will suffice for infantry in fours, military vehicles and cavalry in half sections.

Six feet with no handrail posts will take infantry in file, cavalry in single file, and field guns passed over by hand; 1½ to 3 feet will take infantry in single file.

4. Chesses or planks 1½ to 2 inches thick are sufficient for ordinary traffic provided that they are supported at intervals not exceeding 2½ feet; if they are longer than the width of the bridge they can be economized by placing them diagonally or longitudinally. Planks 10 ft. long by 2 inches thick, and supported at the ends only, must not be marched over by more than two armed men at the same time.

For continuous or heavy wheeled traffic additional chesses should be laid longitudinally, to form wheel tracks.

Hurdles, short fascines, corrugated iron, &c., can be used in lieu of planks, but are not good for horse traffic.

When material is available, chesses should be laid on the ground on the banks on each side for a short distance, to allow horses to become accustomed to the noise before actually getting on to the bridge, and to prevent the ground becoming cut up.

5. In most bridges the ribands should be fairly pliant, in order that the sack lashings may press them tightly down on the chesses throughout. In floating bridges, however, stiff ribands are desirable, as they tend to stiffen the bridge; but for the same reason trestles should be braced diagonally to those on either side (Pl. 51, Fig. 5.)

Rack lashings should be applied at intervals of 4 feet or 5 feet.

6. Handrail should be provided, especially for horse traffic. The normal height above the road is 3 feet. They must be strongly built. The handrail posts must not be nearer than 9 inches from the inner edge of the ribands for

wheeled traffic. Screens on each side are desirable for passing animals over a bridge, especially over running water, while straw or rushes, in the absence of moss litter, tan, or sawdust, may have to be spread on the chesses to prevent slipping. If earth is used it must not be less than 3 inches thick, and allowance must be made in the calculations for the extra weight. (Sec. 93.)

7. If the slope of a boarded roadway, intended for use by animals, exceeds 1-20, light battens must be nailed across the roadway at intervals of about 1 foot to afford foothold in wet weather, the wheel tracks being left clear.

8. All bridges require firmly secured shore ends. A section of a normal type is shown in Pl. 51, Fig. 4.

84.—Trestle Bridges.

(See also Military Engineering, Pt. III, Sec. 7.)

1. Before proceeding with the construction of the trestles a complete section of the gap to be bridged showing the water level, if any, should be marked out on a piece of flat ground. To lay out this section, the width of the gap and its depth to firm bearing at the proposed position of each trestle must be measured along the centre line of the bridge. A long light pole with a string and weight are useful for this purpose, or the method shown in Pl. 32, Fig. 4. If the bottom is very uneven a section for each side of the bridge will be necessary. For a muddy bottom the ledgers could be close to the butts, so as to take the mud; for a rocky bottom they should, if used, be high enough up not to touch the bottom.

2. Trestles may be made in various ways, some of which are illustrated on Pl. 52. The best are those put together with iron fastenings, then come those with wire lashings, while those with rope lashings only are the least satisfactory owing to the impossibility of keeping the lashings taut.

3. Iron fastenings may consist of dogs, spikes, drift-bolts, nails, bolts chains, &c. With dogs the position of each must be chosen with the definite object of preventing a possible distortion of the frame. They should be on both sides of the frame. Dogs should not be driven within 3 inches of the edge or 4 inches of the end of a timber.

Spikes, when driven in pairs, should incline towards each other. They generally run from 5 to 10 inches in length. (See Appendix III, Table 9.) Spikes with chisel points should be driven so that the edge is across the grain.

Drift-bolts are made of rough iron, pointed at one end and with a small head at the other. They may be at any length, and are especially useful for fastening horizontal timbers to the top and bottom of upright ones. Holes slightly smaller than the bolts should be bored to receive them. Wooden trenails may sometimes be used in place of drift-bolts

4. In making trestles with wire or rope lashings square lashings (Pl. 42, Fig. 4) should be used except where the diagonal braces cross. The transom and ledger should be on the same side of the legs parallel to each other; while

the braces are put on the frame with both tips and one butt on the opposite side of the legs to the transom, the other butt being on the same side.

5. The butts of braces can be lashed simultaneously with the ledger and transom. The frame must then be **squared** by adjusting it so that the diagonals, measured from the centre of the ledger lashing to the centre of the transom lashing on the opposite leg, are of equal length. The braces can then be lashed at the tips and crossing point.

6. If the timber is weak, both legs and transom can be doubled. It is of great advantage if a direct support can be given immediately below all transoms. The usual methods of supporting transoms are shown in plate 48 Figs 4 to 8, and Plates 51 to 54. Ledgers and diagonal braces may be of light material, as little strain is brought upon them, but they should be well secured.

7. When the water is very shallow trestles can be carried out and placed by men working in the water. When the water is too deep for this they can be carried on to the bridge and lowered feet first down inclined spars to their final position (Pl. 51, Fig. 5), or taken out on rafts and tipped up in position by means of guys.

8. Trestles of which the legs are all in one plane, are kept vertical by fastening the roadbearers to the transoms and by cross-bracing from each trestle to its neighbour (Pl. 51, Fig. 5). The nearest trestles to the banks on either side should also be rigidly connected to bollards on the bank by light spars fastened to the tips of the legs. These light spars are put on before the trestle is launched, and help to get it into position, and must be secured before the first bay is used for placing the second trestle.

9. On trestle bridges with iron fastenings handrails may be fixed as shown on Pl. 52, Fig. 1. On trestle bridges where lashings are used they may be fastened to the tips of the legs.

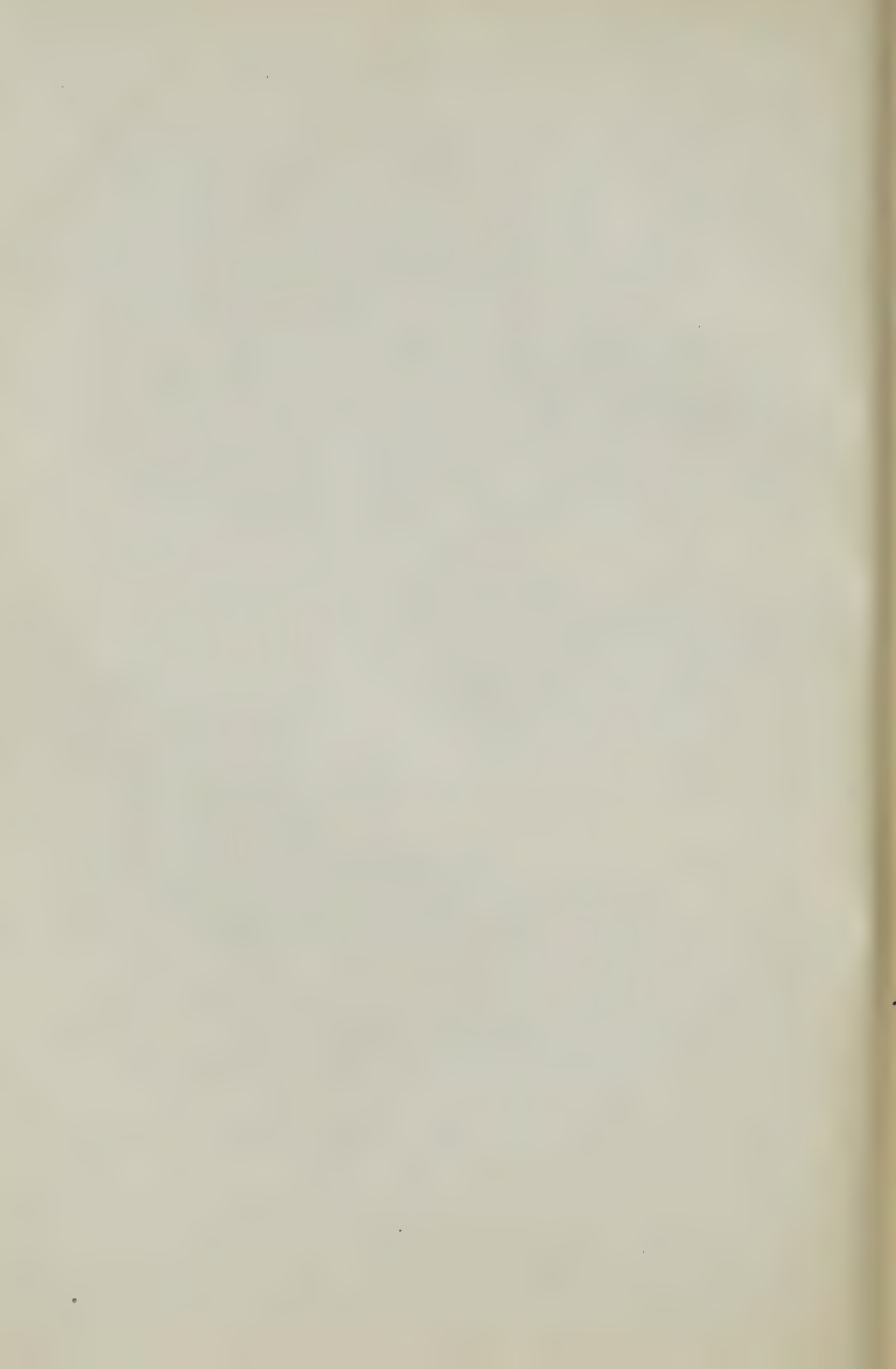
10. Pl. 51, Fig. 2. shows a four-legged trestle made of two frames similar to two-legged trestles, locked at the transoms, and connected by short ledgers at the feet. One frame must therefore be narrower than the other. The inclination of the legs should be such that the breadth of the base on which the trestle stands should not be less than half the weight. The legs must also have an outwards play of $\frac{6}{1}$.

Four-legged trestles can be made of fairly light material, and will stand without bracing. They are consequently useful for small bridges of two bays, requiring one central support, and as occasional steadying points in a long bridge of two-legged trestles; but they are more difficult to place than the latter.

Pl. 52, Fig. 5, shows a four-legged trestle made of squared timbers spiked together.

A light and rapidly constructed trestle footbridge suitable for infantry in single file is shown in Pl. 48, Figs. 1 and 2.

11. One of the most useful substitutes for trestles is cribwork (Pl. 51 Fig. 3.) when timber is plentiful and other stores deficient. If used in water a tray should be formed in the bottom of the crib, which can then be towed into position, weighted with stones and sunk.



When timber is scarce and stones plentiful “crate” piers may be made of stones enclosed in an open framework of timber.

12. The presence of a pier in running water previously unobstructed causes an under scouring action of the water to commence on the upstream side of the pier, which may eventually capsize the pier.

This can be temporarily guarded against by surrounding the upstream side of the pier with boulders or sacks of small stones.

V. MISCELLANEOUS.—III. DUTIES, ETC.

3.—DUTIES IN BILLETS, CAMPS AND BIVOUACS

QUARTERS

(Field service, Regulations, Pt. I, Chap. IV.)

45.—General principles and rules

1. Quarters take the form of:—

Billets,
Close Billets,
Bivouacs.
Camps.

Billets are the usual form of quarters in civilized countries, when not in immediate proximity to the enemy. They allow of proper rest, and give shelter from the weather, but usually cause dispersion of the troops.

This disadvantage may be partially overcome by resorting to close billets when as many men as possible sleep in houses, the remainder bivouacking.

Bivouacs give concentration and readiness, but are trying to the health of men, and horses, and should only be resorted to when tactical considerations make it imperative to do so.

Camps, admit of concentration, and are more healthy than bivouacs, but will only be used on service by troops engaged on field operations in exceptional circumstances. Huts may replace tents if a force is likely to remain halted a long time, as for instance in a siege or blockade.

2. **In the presence of an enemy, tactical consideration, e. g., favourable ground for deployment in the event of attack, concealment facilities for protection, and economy in outposts, are of the first importance.** In these circumstances, the time which it will take to get the troops under arms, and in position to meet the enemy, determines the form of quarters to be adopted.

Thus it will often be possible to billet the main body of an army, its covering force being placed partly in close billets and partly in bivouacs.

When not in proximity to the enemy, **the health and comfort of the troops are the first considerations.**

3. If an engagement is anticipated, the larger units should be distributed in the order from front to rear in which they will come into action, provided that when liable to attack infantry is placed in the more exposed positions; cavalry and other mounted troops in the less exposed. Artillery, train, ammunition columns, and medical units should always be covered by the other arms.

4. The following rules will be observed in distributing troops:—

- i. Depôts should be near good roads.
- ii. Dismounted units should be nearest the water supply.
- iii. Staffs and hospitals have the first claim on buildings.
- iv. When shelter is limited, cavalry and then other mounted troops have precedence of dismounted troops.
- v. Hospitals should be given a quiet spot and the most sanitary position.
- vi. Staff and telegraph offices should adjoin each other, if possible, and should be clearly marked. (For distinguishing flags and lamps, see "Field Service Pocket Book.")
- vii. Officers must be close to their men.

5. If a force is halted for a single night, only, dismounted troops should not be quartered at a greater distance than from 1 to 2 miles from their line of march next day.

46.—Hygiene and sanitation in quarters

(For special sanitary measures in billets, see section 53, and in camps and bivouacs, Sec. 60.)

1. Every officer is responsible that all orders affecting the health of an army are rigidly carried out by the troops under his command. **Neglect of sanitary precautions inevitably results in great loss of life and efficiency.**

2. Men must get as much rest as possible. If an early start is contemplated, no man should stir till ordered to turn out. Preliminary arrangements for breakfast should be made over-night.

3. As the health of a force depends largely on the purity of the water provided, everything possible must be done to ensure an ample supply of pure drinking water.

For this purpose a certain number of specially trained N.C.O's and men of the Royal Army Medical Corps are attached to each unit.

Men must be prevented from drinking water that is not pure and must be trained to economize the contents of their water-bottles.

Water is best rendered safe for drinking purposes by being boiled, or by

the use of sterilizing filters, which must be kept clean, as otherwise they become dangerous. (See "Manual of Field Engineering.")

The filter usually provided for field service is the filter water tank which will sterilize about 200 gallons in an hour. The water must always be cleared first, or the filter may become clogged.

4. Whenever filters, sterilizers, or other means of purifying water are available, two men per company or corresponding unit should be detailed for the purpose of providing pure water.

Vessels or tanks in which drinking water is stored are to be carefully covered, to keep out dust, &c., and they should be raised off the ground and provided with taps.

A dirty tank or water-bottle may easily be a source of danger to health. The necessity of frequently cleaning them out or scouring them with boiling water or chemicals provided for the purpose must be borne in mind.

Water tanks and water-bottles must be frequently inspected by a medical officer.

5. Milk (other than sterilized or condensed) should be boiled before use.

ADMINISTRATION AND DISCIPLINE

47.—Duties of the commander of a brigade area.

1. The area allotted for quarters to each cavalry or infantry brigade, to the divisional troops of a division, and to any improvised organization approximately equal to a brigade, will normally form a command, termed a **brigade area**, for purposes of discipline and administration in quarters.

If, however, brigades or similar organizations have to be broken up, or a force is much scattered, it may be more convenient to fix areas, the limits of which do not coincide with the limits of the quarters occupied by brigades and similar organizations. In this case commanders, who will perform the duties here laid down for the commander of a brigade area, will be appointed by the authority who defines the area.

2. A commander of a brigade area is responsible for all internal arrangements in his area.

He allots areas to his units;

Fixes the alarm post for his command;

Takes steps to have extra communications opened out, if they are required;

In billets, takes precautions against fire or a rising of the inhabitants;

And settles police and sanitary measures.

Many details connected with the selection, distribution, administration and discipline of troops in billets, camps, or bivouacs may, with advantage be laid down in divisional or other standing orders, and only altered when necessary.

3. In choosing alarm posts and wagon parks, care must be taken that

main communications shall not be blocked, in the event of troops having to turn out suddenly, possibly in the dark.

The necessity for concealment from aircraft must also be considered.

Alarm posts should be so situated that the grounds to be defended in case of attack can be quickly reached from them. If units are very scattered in billets it may be advisable to direct them to remain on squadron, battery, and company alarm posts on the alarm sounding, *see* Sec. 49.

4. The commander will take steps to ensure that the direction of all principal roads and the position of all important points in his area, *e.g.*, brigade staff office, &c., are clearly indicated by means of improvised sign boards, or by flags or lamps (Sec. 45, 4, footnote).

5. In each brigade area a place for a market will, if necessary, be selected and a tariff of prices arranged in conjunction with commanders of other areas.

All persons coming into the area to sell articles of any kind must be confined to this place.

48.—General arrangements on the arrival of the troops.

1. Before the troops are dismissed, all necessary defensive precautions must be taken, and forage parties detailed.

The arrangements of the brigade area, the boundaries of the units area, and other matters of a similar nature will also be explained to the men.

2. **Units, on their arrival, should be halted on their alarm posts. Everyone must be made clearly to understand what he has to do in case of alarm, and should know the names of all prominent features of ground near the area, and where the roads in the immediate neighbourhood lead to. Names should be invented for such features if none exist.**

3. No troops, other than orderlies and parties for water, wood, forage, &c., under proper control, are to quit their areas until leave has been given by the commander of the brigade area.

4. Each commander of a unit will, without delay, send an orderly who knows the position of the unit's headquarters to report himself at the brigade office.

5. If a state of **constant readiness** is ordered, troops will remain accoutred and will sleep with their arms handy, and it may even be necessary that horses should be kept always saddled and harnessed. In billets, lights must in this case be kept burning in houses, stables, and streets; and doors must be kept open.

6. Only sufficient rifles will be left at the gun parks of artillery for guard purposes, the remainder will be taken by the troops to their billets.

49.—Discipline

1. The daily duties mount, as a rule, immediately a new halting place is reached. When a force remains halted for some time, and in standing camps, the hour for duties to mount will be notified in orders. A field officer of the day



with a medical officer and a quartermaster to assist him, will be appointed in each brigade area; and in each regiment, brigade of artillery, battalion, or similar unit, an officer of the day will be detailed. In each squadron, battery, and company, an orderly non-commissioned officer will be appointed.

2. A staff officer, or representative, is always to be present at the staff office of an area. A brigade adjutant of the day will be appointed to act for the staff of the area in his absence.

3. The field officer of the day is responsible that the orders of the commander of the brigade area for the preservation of good order, the sanitation and the internal defence of the district are observed. Regimental officers of the day report to him.

4. Regimental officers of the day, and orderly non-commissioned officers, fulfil similar duties as far as their own areas are concerned.

5. **Inlying piquets** are mounted under the orders of the commander of the brigade area, when required for internal security, or they may be ordered by the commander who appoints the commander of the outposts to act as a reserve to the outposts.

In the latter case the piquet stands to arms one hour before sunrise (Sec. 80).

Should the inlying piquet be required to leave an area its commander should at once notify the fact to the field officer of the day, with a view to a fresh inlying piquet being mounted.

6. The "Alarm" will be sounded only by order of the commander of a brigade area or of superior military authority, unless an actual attack is impending, when it may be sounded on the responsibility of any officer or of the commander of a guard.

7. On the "Alarm" sounding, an officer from each unit is to be sent for orders to the brigade headquarters.

Troops fully armed and equipped will fall in by squadrons and companies on their alarm posts, gunners will fall in on their gun parks, all drivers, including artillery will proceed to their horses.

Draught horses and pack animals will be harnessed and saddled up, but the commander will be guided by the military situation whether to order them to remain in their billets or to be hooked in.

BILLETS

50.—General principles.

1. In the case of large bodies of troops (e.g., two or more divisions), when tactical considerations admit, and roads are available, the divisions should be billeted on parallel lines, each being distributed on a narrow front and in depth.

This arrangement admits of each division being closed up on the front

more readily than when divisions are billeted in échelon, and is economical of time and labour when a force is marching from day to day (Sec. 23). For if the rear of a division, marching on one road, can be quartered close to the route to be followed, at a distance from the head of the division approximately equal to the length of the whole in column of route, it can resume its march without check.

If a division marching from day to day is concentrated at the end of each day's march, it is necessary for the rear to wait until the head of the column has covered a distance about equal to the length of the column, before it can begin its march.

This delay impairs the marching power of the whole.

2. In allotting areas, units should be kept together as far as possible under their own commanders, but in order to make full use of stabling it may be necessary to mix the arms.

3. **On the line of march, the utmost possible use should be made of buildings on or near the roads by which the force is marching.**

51.—Allotment of billets

(For data as to accommodation in billets see "Field Service Pocket Book.")

1. Whenever possible, billets will be allotted in advance. Billeting areas may be allotted to armies or divisions, in the first instance on a basis of population. But the capacity of areas varies greatly with their character; e.g., whether urban or rural, agricultural or industrial rich or poor, and with the season of the year.

Data as to the capacity of an area should therefore be collected beforehand, if circumstances permit. In the absence of such data it may be taken that ordinary billets with subsistence can be provided by an area for a force about equal to twice its total population for one week.

Billets without subsistence can be provided at the rate of about 10 men per inhabitant in rich agricultural districts, and at the rate of about 5 to 6 men per inhabitant in town or industrial districts.

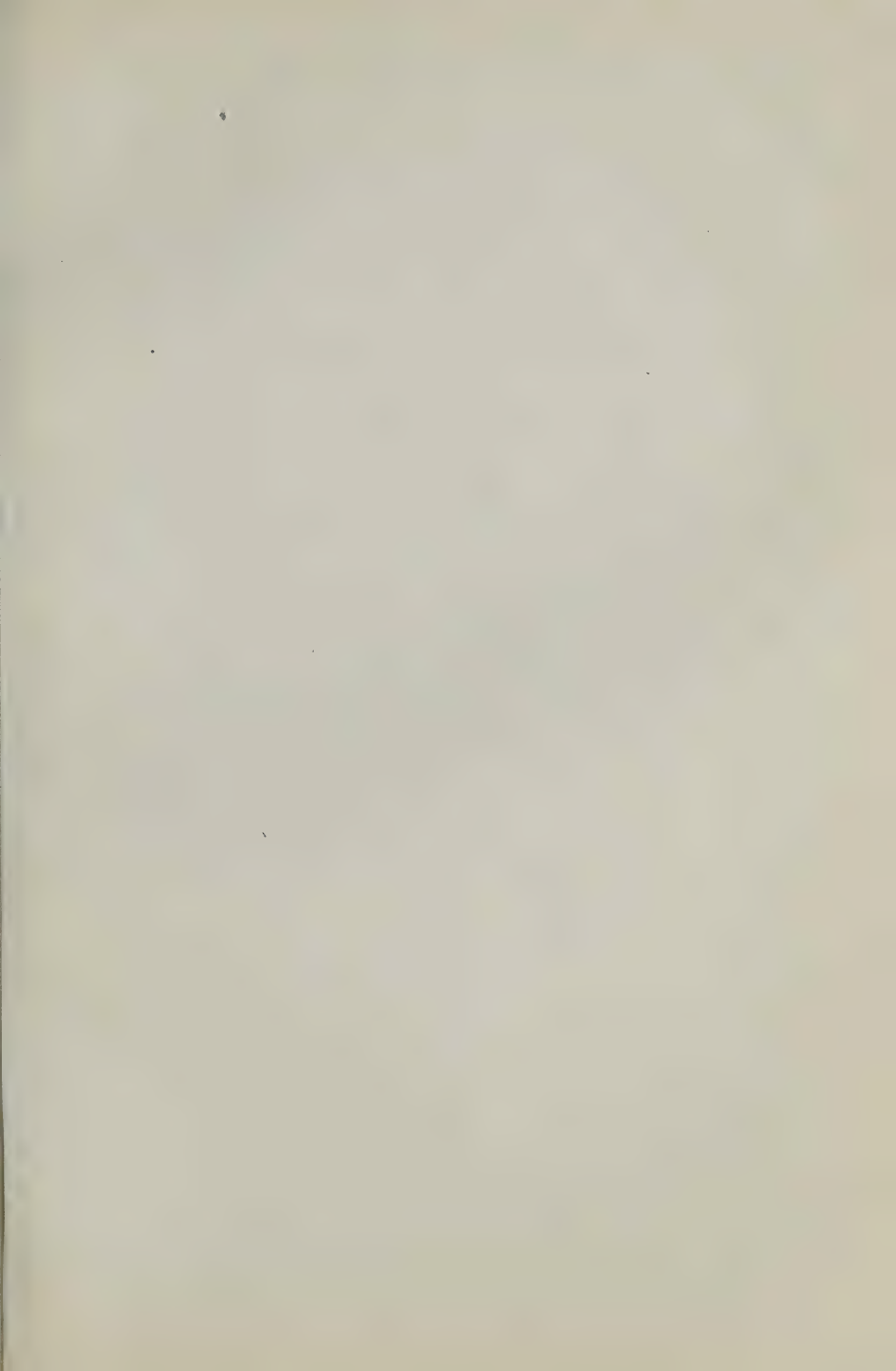
No data can be given for close billets, in which men for whom no shelter can be provided must bivouac.

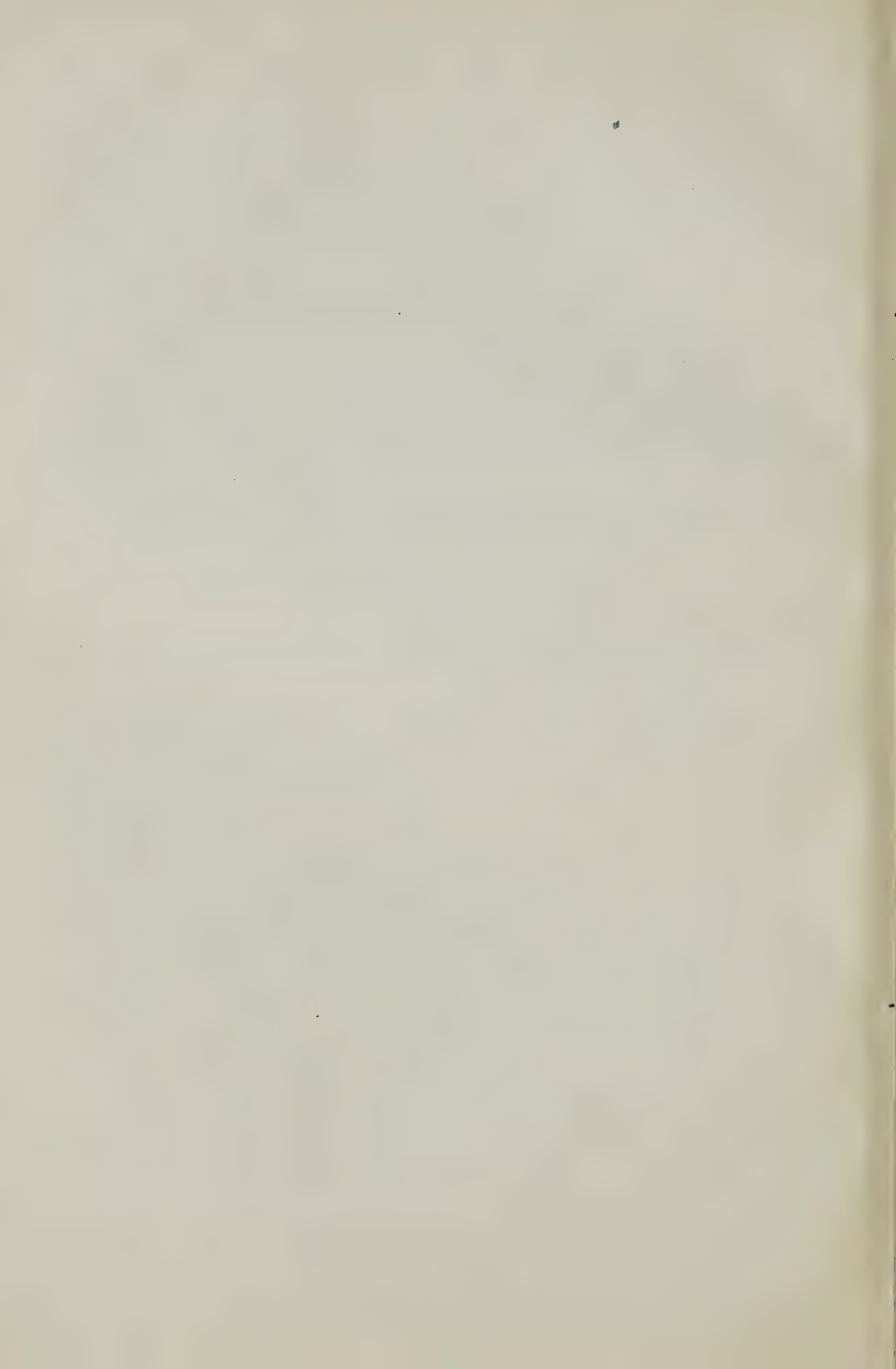
In the case of large units (divisions), billeting parties will be sent ahead for the purpose of making arrangements with the local authorities. These parties will be in charge of an officer of the quartermaster-general's staff, and will include representatives of the brigades and divisional troops.

They should move with the protective cavalry if possible.

Regimental billeting parties (see 3 below) should march with the advanced guard when tactical considerations permit.

2. As soon as the distribution of troops to areas has been decided by the general staff, any necessary adjustment of the areas in detail will be carried out





by the quartermaster-general's branch of the staff, and commanders of these areas will in their turn distribute the accommodation among units.

In such circumstances billeting demands, together with any special orders to be observed by the inhabitants, should be issued by commanders of brigade areas to representatives of units, who will proceed with billeting parties to the localities apportioned to them, so far as tactical considerations admit, and take over their areas, when they will in turn, send back to meet and guide their units to their billets.

It is important that commanders of neighbouring units should inform one another of any vacant accommodation in their areas, but all changes should be notified to headquarters.

3. A regimental billeting party should, if possible, consist of an officer or non-commissioned officer, and two rank and file per company, &c., for each unit concerned,

Before starting for his allotted area, each officer (or non-commissioned officer) should receive a statement showing the number of officers, men, and horses for whom accommodation (and food if this is to be demanded) is required.

If possible, the topography of the locality should be explained.

4. On arrival in the locality to be occupied, the officer, or non-commissioned officer, in charge of the party will proceed direct to the mayor. When a town is divided into two or more brigade areas, the senior officer of the billeting parties of each brigade area will hand in the billeting demands for his area, and will distribute the accommodation allotted amongst his units. Chief officer of police, or other official holding an equivalent position, to whom the billeting demand will be handed, together with any instructions to be observed by the inhabitants.

The mayor or other official will at the same time be notified of the hour at which the troops may be expected, and will be requested to supply information as to the existence of any infectious disease, to designate the house or locality affected, and to notify any special precautions to be taken in respect of water supply, sanitation, fire, &c.

5. If time permits, a billeting order (A.F. F.789, **see below**) will be prepared by the local authority for presentation by the billeting party to each inhabitant on whom men and horses are to be quartered.

This order will show the number of men and horses to be received, and whether food and forage is or is not to be supplied.

6. On receipt of the billeting orders, the officer (or non-commissioned officer) in charge of the billeting party will issue them in proper proportion to the representative of each company, who will be given instructions regarding the posting of warnings outside infected buildings, special arrangements for watering, &c., and the place to meet the officer (or non-commissioned officer) when the billets have been inspected.

The men of the party will then proceed to the houses and stables allotted to their respective formations, will inspect and mark the billets, and will hand the billeting orders to occupiers.

They will mark clearly with chalk on the door the names of officers, the

number of men and of horses the building is to hold, and the command, *e.g.*, squadron, battery, or company, to which it is allotted, official abbreviations being used. The marks must be removed before marching off.

Army Form F789.

(b) BILLETING ORDER ON INHABITANTS

(Issued by the mayor, magistrate, Chief, police officer, or other local authority)

Number of the Billeting Demand.....

(1 Quarters for—

Generals,
Field Officers,
Captains and Lieutenants,
Warrant Officers,
Staff Serjeants and Serjeants.
Rank and File,
Horses, &c.,

are to be provided, *together with subsistence as follows:—

by.....(Name).....at No.....
.....Street

Place and date

Signature of the Head of the
Community.

7. In the meantime the officer (or non-commissioned officer) will select and mark the position of the regimental headquarters, guard room, alarm post, sick inspection room, gun and transport parks, etc., and will ascertain the most suitable lines for communicating with neighbouring units, and the best roads into and out of the billeting area.

This complete, he will if possible prepare for the information of the regimental commander a rough sketch showing the allotment of billets to the unit, and giving details regrading roads and communications.

8. On reassembling his men, he will notify them of the positions of the

* Strike out if no subsistence is to be provided.

headquarters, guard, etc, and a proportion will be despatched to convey this information to companies, and to guide them to their billets.

When time is not available for the above procedure the troops will be halted outside their billeting areas.

Meanwhile a party from each brigade demand area will proceed to the mayor or other official, to whom a billeting demand will be presented and whose co-operation in the allotment of billets will be requested.

The local authority will then take steps to notify to the inhabitants that troops will be billeted on them and will promulgate any military orders to be observed.

At the same time the billeting party will roughly allot the accommodation, areas being assigned to the larger units, and these in their turn allotting certain streets or groups of houses to their units.

9. In allotting billets, regard will be had both to the comfort of the men and the interests of the inhabitants. Billets may have to be readjusted after the troops have settled into them.

The following points should be observed in addition to those given in Sec. 45, 4. :—

- i. Staffs offices should be on main communication, and easily found.
- ii. Mounted men must be near their horses, guns, and wagons; and staff officers near their offices.
- iii. Both sides of a street should be allotted to the same unit to prevent confusion in case of alarm.
- iv. Roads and communications must never be blocked. Guns and vehicles must, if necessary, be parked outside towns and villages, and must, if possible, be hidden from aircraft. If parked on the sides of roads, the first and last guns or vehicles should be marked with a light.

52.—General rules in billets

1. Officers will visit the billets of their men and their horses' stables at irregular intervals, at least once by day and once by night.

2. If necessary, the inhabitants should be disarmed and forbidden to leave their houses after a certain hour; the streets should be patrolled to see that this order is obeyed. It may be necessary to take hostages for their good behaviour. Inhabitants who have leave to be out after dark should carry lights.

3. From the moment the advanced billeting parties enter a village or farm, precautions must be taken to prevent the inhabitants conveying information to the enemy.

The local telephone system must be at once controlled.

All ranks should be warned against talking on military matters in the presence of inhabitants, against leaving letters or papers about, and of the importance of taking every possible precautions against any leakage of information.

4. Military tribunals should be established to deal with any infractions by the inhabitants of the orders issued concerning them, and with any offences committed against the troops.

All houses where liquor is obtainable must be placed under control.

5. In every house occupied by the troops at least one man must be specially detailed to guard the arms. Arms are not to be piled or left outside.

6. As a precaution against fire, and also to prevent signalling to the enemy by means of lights, directions should be issued controlling the use of fires and lights, both by the troops and by the inhabitants. It may sometimes be necessary to establish special fire piquets.

7. When the enemy is within striking distance, the villages in the front line should be prepared for defence against surprise, and a portion of the troops in them kept in a state of constant readiness (Sec. 48) so that the defences may be rapidly occupied.

8. As troops in billets are usually dispersed over a wide area, an alarm signal should be arranged for use in the event of the troops being required to turn out suddenly.

9. Cover is all that officers and men have a right to expect in billets on active service, unless the inhabitants also provide subsistence. If either bed or furniture is supplied, it is a matter of civility on the part of the owner and must be received as a favour and not as a right.

10. Staff officers must, immediately on arrival, communicate their addresses to the headquarter office of the district in which they are billeted.

53.—Sanitation in billets.

The local authorities should usually be required to take such sanitary measures as may be needed, but it may be advisable to give them assistance, particularly in close billets, in which the construction of additional latrines, watering and washing places will often be necessary.

Billeting parties should invariably ascertain the source of the local water supply, the measures which may be necessary to guard it from pollution, the sanitary system of the place, and should make enquiries as to the existence of any infectious diseases.

Sentries should be posted at the first opportunity over houses where infection exists, and over any other houses in which it is not desirable to quarter men.

When the same billets are to be used by successive bodies of troops, it is of the utmost importance that they should be left scrupulously clean.

In such cases arrangements should be made to supervise and, if necessary assist the local authorities in this work after the departure of the troops.

54.—Close billets

In close billets as many men and animals as possible are billeted, and the remainder bivouac.

Close billets are adopted when a greater state of readiness is required than is possible in ordinary billets. For this reason, tactical considerations invariably have precedence over considerations of comfort in close billets, and arms and units should never be mixed.

In allotting close billets, every form of shelter should be fully utilized. Close billets will, normally, be used for short periods only, and it is not therefore necessary to consider the interest of the inhabitants to the same extent as in ordinary billets.

Where close billets have to be occupied for any length of time, as in the case of sieges, it is advisable to remove the inhabitants, and accommodate them outside the immediate zone of operations.

In other respects the instructions for billets apply to close billets.

CAMPS AND BIVOUACS

55.—General Principles

1. (a) The site for a camp or bivouac should be dry, and on grass if possible,
- (b) Steep slopes must be avoided, but gentle slopes facilitate drainage.
- (c) Large woods with undergrowth, low meadows, the bottoms of narrow valleys, and newly turned soil are apt to be unhealthy.
- (d) Clay is usually damp.
- (e) Ravines and water-courses are dangerous sites, as a sudden fall of rain may convert them into large streams.
- (f) Sites of old camping grounds should, if possible, be avoided.
- (g) A good water supply is essential, but considerations of safety may necessitate a camp, or bivouac, being placed at some distance from it.
- (h) Other points to be considered are the facilities which a site offers for obtaining shelter, fuel, forage, and straw.

56.—Arrangements at the end of a march

1. A staff officer, usually accompanied by some mounted police, will be sent forward to select, in conjunction with an engineer and a medical officer, and with due regard to tactical considerations, water supply, &c., the ground where the force is to pass the night. He will make all necessary arrangements for the reception of the troops on their arrival.

2. When the column arrives within two or three miles of its destination, staff officers of brigades, &c., accompanied by representatives of their units, will ride ahead, receive instructions concerning arrangements for the night, lead their units on arrival direct to the ground allotted to them, and explain the arrangements to commanders of units.

The commanders of the train and of the rear guard will report personally to the commander of the column as soon as they have reached their destination.

3. Each unit is to make arrangements to have its train guided to its destination.

Animals on arrival should be relieved of their loads and girths loosened as soon as practicable.

4. When ground is allotted, each commander must be informed of any localities or depôts, outside his own area on which he may draw for water, fuel, forage, straw, and other supplies.

If grazing is necessary, grazing grounds will be allotted and arrangements made for their protection by the authority allotting them.

5. It must also be made clear to each commander which roads he is at liberty to use, and what special defensive, police, or sanitary measures he is to take.

The place to which dead animals are to be dragged, and how they are to be disposed of, must also be described.

6. Where bodies of troops are camped or bivouacked close together, the general position of the latrines and kitchens of each area will be settled by superior authority, in consultation with the senior medical officer; that is to say, it will be decided whether they are to be in front, at the rear, or on the flank of an area.

7. Special care is necessary to prevent troops from the various areas crossing one another in proceeding to ground which they may have to defend in case of attack.

57.—Watering arrangements

1. The military police, or in their absence the first troops to arrive at a halting ground, will mount sentries on all water likely to be required for use, with such orders as will prevent any form of pollution. These sentries will not be withdrawn until permanent water guards are detailed.

2. The water supply will always be selected in conjunction with the sanitary or other medical officer, who will satisfy himself as to its fitness for use.

3. If water is obtained from a stream, horses will be watered below the place where troops obtain their drinking water, but above bathing and washing places. Patrolling by mounted men will often be necessary for some distance above the spot where the drinking water is drawn.

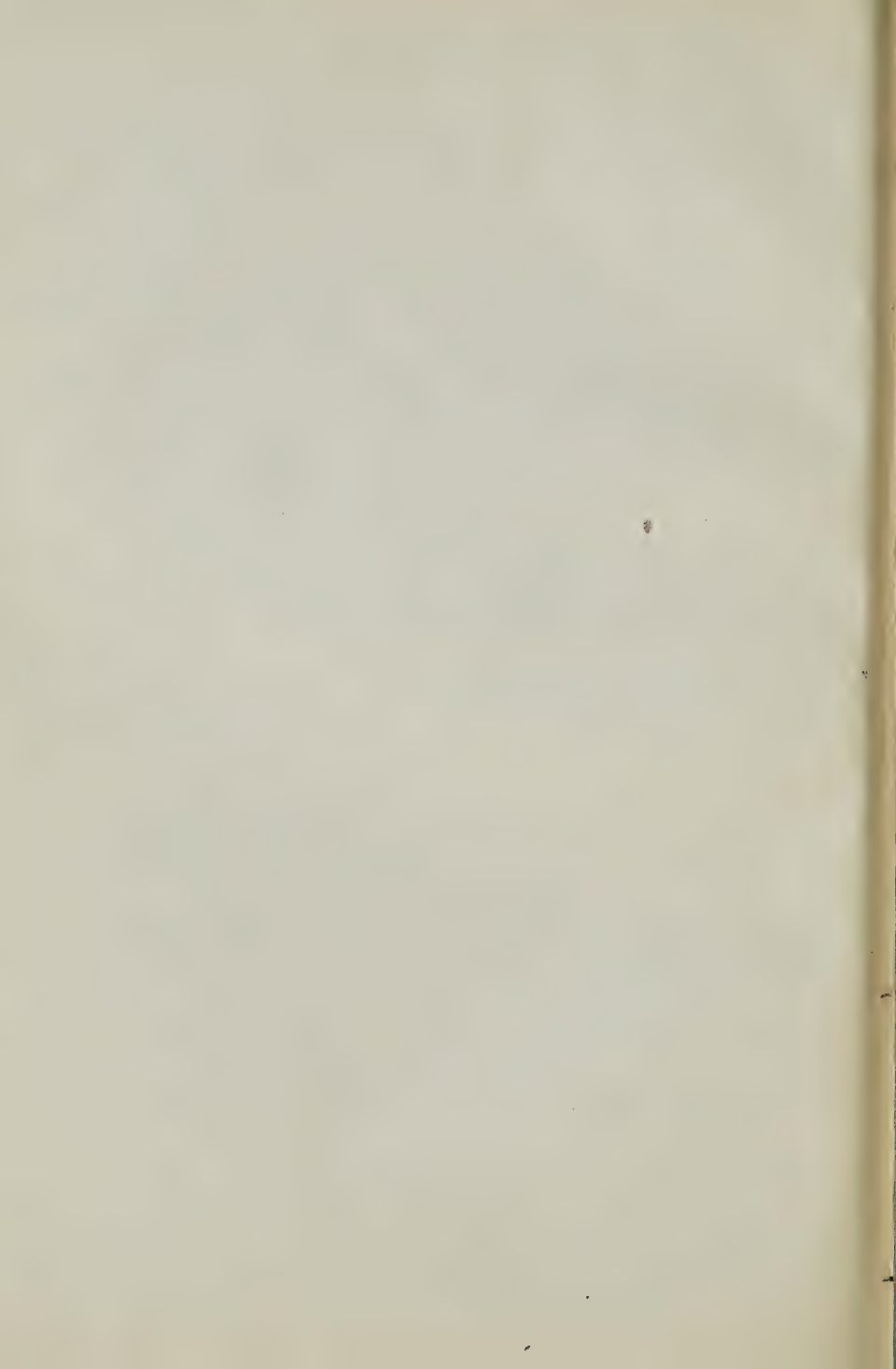
4. The water supply will usually be marked with flags by the advanced party of engineers (Sec. 66, 3):—

White for drinking water.

Blue for watering places for animals.

Red for washing or bathing places.

5. If running water is not available, a rough barbed wire fence, or some other form of fencing, should be placed round the water supply, to keep out animals which should in this case be watered by bucket or nosebag. Washing should be



allowed only at some distance from the water supply, empty biscuit tins, or other receptacles, being used to draw water for this purpose.

Similar precautions are often necessary with running water, if other bodies of troops are halted lower down the stream.

6. If many animals have to be watered and the frontage is small, hours for watering and the route to and from watering places, will be laid down for each unit.

Three to five minutes may be taken as the average time for watering an animal.

An officer will invariably accompany watering parties of more than 20 animals.

7. A daily average of 1 gallon per man is sufficient for drinking and cooking purposes.

A horse, bullock, or mule drinks about $1\frac{1}{2}$ gallons at a time.

In standing camps, an average allowance of 5 gallons should be given for a man, and 10 gallons for a horse.

58.—Picketing

1. Horses should be picketed in lines facing away from the prevailing wind if possible, and hidden, when possible, from aircraft.

2. A horse, when picketed, requires a frontage of about 5 feet and a distance of 4 yards. When horses are fresh from stables, it may be necessary at first to increase the frontage.

3. A gangway of 5 yards will be maintained between two horse lines, and between a horse line and the nearest building, wall, &c., or the pegs of the nearest tent.

4. Saddlery and harness will as a rule be placed in the gangways in rear of the heel pegs: forage at the rear ends of the horse lines.

5. Head ropes will be fastened at such a length as to be just slack when the horse is standing naturally.

6. If horses are unaccustomed to picketing, the men should be kept as much as possible among them.

59.—Parking guns and vehicles

1. In parking vehicles, the following distances should be kept clear in front of guns or vehicles, which should be parked with the units to which they belong:

Heavy gun (8 horses)	16 yards.
6-Horse gun or wagon	12 "
4-horse vehicle	8 "
1 or 2-horse vehicle	5 "

Mechanical transport vehicles will require special arrangements.

2. A minimum interval of 1 yard should be left between guns or transport vehicles.

If space admits, guns should be parked at half interval (10 yards).

60.—Sanitation in camp and bivouac

1. The method of constructing latrines is described in the "Manual of Field Engineering."

Where natives are employed special latrines for them are necessary.

The supervision of latrines is absolutely necessary in order to ensure excreta being at once covered up. Disease may be easily spread if latrines are not carefully attended to.

2. Urine may spread infection. Men are on no account to urinate elsewhere than in the latrine trenches, or in urinals or pits set apart for the purpose. Receptacles, such as empty biscuit tins, should be placed at convenient spots close to the tents at night, to be used as urinals, to prevent pollution of the ground.

3. Latrines, urinals, refuse pits, cattle-lines, &c., must be situated at least 100 yards from, and when practicable to leeward of, the water supply and kitchens. They must never be placed in or near gullies which, when it rains, discharge into the water supply, nor in any situation the drainage or filtration from which may possibly reach, and so pollute, the water supply.

4. The contents of latrine trenches should be covered with a couple of inches of dry earth daily. The use of kerosine oil and lime will assist in keeping flies away.

61.—General rules in camps

"For details as to tents, sizes of camping grounds, &c., see Field Service Pocket Book.

1. The shape and the size of a camp or bivouac will, subject to the following general rules, be determined by the ground.

2. In brigade and larger encampments, one main centre and one main cross street will run the entire length and depth of the camp.

Units should not be cramped for space more than is absolutely necessary.

On the other hand, the dimensions of a camp or bivouac must not be increased unduly, as a straggling camp entails extra fatigue duties in circulating orders.

3. The usual interval between units is 10 yards.

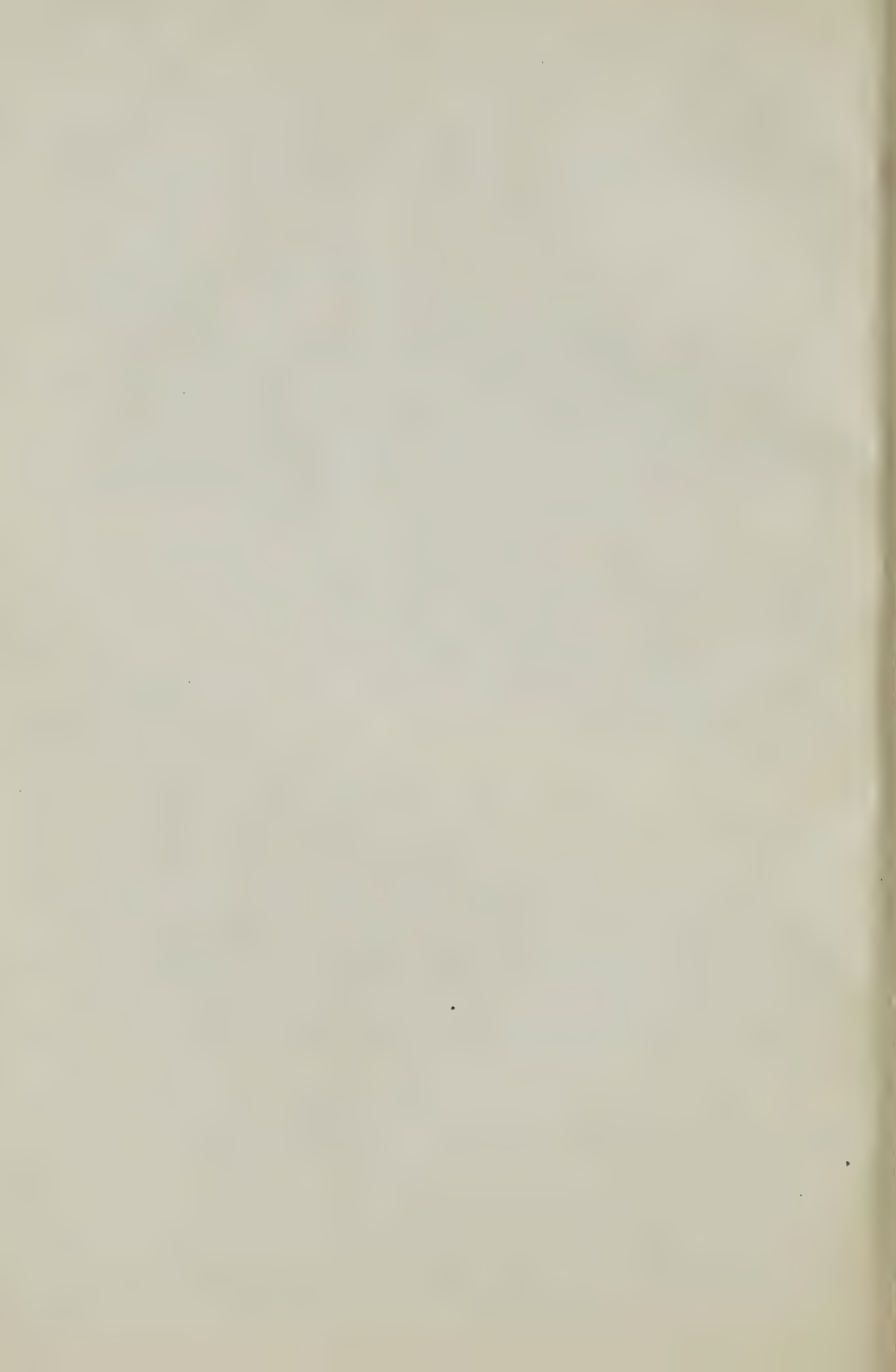
Between squadrons of the same regiment,

And between the component fractions of an artillery brigade, the interval may be reduced to 1 yard,

And, between the companies of a battalion to 3 yards.

4. A trench should be dug immediately under the curtain of a tent and the excavated earth banked on the outer edge of the trench.

The curtain should then be pegged to the inner slope of the trench, the canvas thus draining into it.



Surface drains should be constructed to prevent rain-water lodging in the trenches.

Half-an-hour's work on the first wet day, when the natural run of the water can be seen, will do more to keep the camp healthy than a day's work in dry weather.

5. Tent flies are to be looped up the first thing every morning, in wet weather on the leeward side only.

In a standing camp, tents will be struck periodically and the ground underneath well swept and left exposed for some hours at least, the tents being eventually replaced on their former sites.

Tents should never be pitched for occupation in the intervals.

6. Tent doors should generally face away from the prevailing wind; in mounted units they should face the horse lines.

7. A light is never to be left burning in an unoccupied tent.

8. If rain or heavy dew is likely, tent ropes must be slackened.

9. If a camp is pitched in or near long dry graass or heather, special precautions must be taken against fire.

10. No mounted officer or man riding or driving inside the camp is to go out of a walk except when on duty, and with special orders as to pace.

62.—General rules in bivouacs

1. Mounted men bivouac in the gangways in front of their horses.

2. By day, infantry pile or ground arms on the alarm post, articles of equipment being laid by the arms.

By night, men will invariably rest with their arms and equipemnt by them. In some cases men must sleep fully equipped (Sec. 87).

63.—Standing camps and rest camps

1. When laying out a standing camp, tents, at the required intervals and distances, should be dressed both from the front and flank; main and cross streets should be maintained for the purposes of communication.

2. A system of surface drainage should be constructed.

3. Care should be taken to prevent the pollution by latrines or refuse pits of ground within 100 yards of the encampment, or any possible extension of it. An improvised pail system of removal should be established if possible.

4. Incinerators for burning dead animals, refuse, &c., should be constructed.

Horse and cattles lines should be cleaned regularly, dung removed, and special precautions taken to prevent ground in the neighbourhood of kitchens and washing places becoming fouled.

Flies are a constant source of disease, and great care is necessary to prevent them from breeding in dirt and refuse, and from coming in contact with food.

5. Notice boards should be put up showing the position of offices, dépôts,

hospital, veterinary hospital, watering places, latrines, urinals, refuse pits, &c. and a plan of the camp should be on view at the commandant's office.

All parties, on arrival, should have the arrangements, including those for defence when necessary, and the rules of the camp fully explained to them.

6. Camping grounds should be definitively allocated for mounted troops, dismounted troops, and convoys, respectively.

Infantry camping grounds should not be used by mounted troops.

7. The arrival at, and departure from, a rest camp or post on a line of communication, of any body of troops, will be reported by its commander to the commandant of the camp or post.

Detached officers will write their names in a book provided for the purpose, stating the duration of their stay and the duty on which they are travelling.

V. MISCELLANEOUS.—III DUTIES, ETC.

Duties in Billets, Camps and Bivouacs (Manual Field Engineering Cap. 9.)

CAMPING ARRANGEMENTS

59.—Field Kitchens.

(See also Military Engineering, Pt. V, Sec. 1.)

1. The simplest arrangement for cooking in the field for any party over 20, if the halts are not of long duration, is to place a proportion of the kettles on the ground in two parallel rows about 9 inches apart, handles outwards, block the leeward end of the trench so formed with another kettle, lay the fire between the kettles and place one or two rows of kettles on those already in position. (Pl. 33.)

Mess tins can be arranged similarly, but in their case not more than eight should be used together.

2. The most economical method where time is available is to dig or raise a narrow sloping trench for the fire on which the kettles are placed. The interstices are then filled up with stones and clay so that the fire, fed from the windward end, may draw right through. A chimney may be built at the other end to increase the draught. (Pl. 34, Fig. 1 to 4.)

The chimney can be built of sods, supported where it passes over the trench by flat stones, slates, wood covered with clay, &c. The inside of the trench and of the chimney may be plastered with clay to make them last longer. Several such trenches may be combined, as shown in Fig. 2, to form what is known as the **parallel** or rectangular kitchen, or three trenches may converge to one flue, as shown in Fig. 3, forming what is known as the **broad arrow** kitchen.

3. Figs. 5 and 6 give details of a covered kitchen, suitable for standing

camp. The roof may be covered with tarpaulins, or in the manner described in Sections 64 and 65.

60.—Field Ovens.

1. The simplest form of a field oven consists of a hole burrowed in firm ground in the face of a bank (Pl. 35, Fig. 5), or the hearth may be sunk below the ground surface, with an arch formed by a hurdle or sheet iron on the top of which earth is piled (Pl. 35, Figs. 1 to 4). As sheet iron is liable to become distorted under the weight of the covering and heat of the fire, it is advisable to stiffen it by ribs of iron, if procurable. An old cart wheel tyre cut in two is very useful for this purpose. The two gable ends can be formed with sods. When a hurdle is used it should be well plastered on the outside with a mixture of cow dung and clay, so as to leave an arch when it burns away. The entrance to the oven is closed either by a hurdle plastered with clay or by sods.

This oven is specially suitable for making bread, and will bake for about 150 men at a time.

61.—Water Supply

(See also F. S. Regs., Pt. I, Sec. 57, and Military Engineering, Pt. I, Secs. 3 to 7)

For stores, see Appendix III, Table 13.

1. A daily average of one gallon per man is sufficient for drinking and cooking purposes.

In standing camps, an average allowance of 5 gallons should be given for a man, and 10 gallons for a horse.

A horse, bullock, or mule drinks about $1\frac{1}{2}$ gallons at a time.

In making calculations of the time and space required for watering horses, each animal should be allowed five minutes at the trough, and four feet of lateral space.

The service 33 ft. trough holding 600 gallons will water 16 horses at a time, using both sides of the trough.

2. The rough average yield of a stream may be measured as follows:—Select some 15 yards of the stream where the channel is fairly uniform, and there are no eddies. Take the breadth and average depth in feet in three or four places. Drop in a chip of wood and find the time it takes to travel, say, 30 feet. Thus obtain the surface velocity in feet per second. Four-fifths of this will give the mean velocity, and this multiplied by the average sectional area in square feet will give the yield per second in cubic feet of water (one cubic foot equals six and a quarter gallons.)

3. The source of the water supply should be carefully investigated, and measures taken to prevent the pollution of the water **en route** to the drinking supply. Water from small ponds and shallow wells should be avoided.

4. Water near the surface should be sought for in hollows where the earth is moist or the grass unusually green, or where the thickest mists rise in the mornings or evenings; in valleys just above a contraction in width or at the point of junction with a branch valley. Where a line of rocks just shows above ground, water will often be found by digging on the uphill side of the rocks and not too close to the outcrop.

5. If the supply be from springs, each springhead should be opened up and surrounded by a low puddled wall to keep out surface water. Casks or cylinders made of brushwood, like gabions, make good linings for springs. After they have been placed in position, puddled clay may be worked down between them and the banks. The overflow may be received into a succession of casks or half barrel (which may with advantage have their inside charred) let into the ground close together, the overflow from the first passing in the second, and so on; or deep narrow tanks with puddled sides may be constructed to catch the overflow.

6. If the supply be from a lake, pond, or stream, separate watering places for men and animals must be marked out and sentries posted.

In a stream the men should draw drinking water above the place for the animals, but the washing, &c., should be done below it. Barrels sunk in the bed of a small stream afford convenient dipping places. Water bottles, camp kettles, and similar articles liable to convey dirt must on no account be dipped direct into drinking water tanks, &c., Clean tins or dippers must be provided if draw-off taps are not available. Drainage should be disposed of as far below the sources of supply as possible.

7. The "lift and force pump," weighing 84 lbs. complete, is the pattern in general use in the service. It is worked by two men. It can lift water from a maximum depth of 28 feet, and force it 32 feet (i.e., 60 feet in all), at a rate of 12 gallons a minute. Two are carried in the field by each Field Troop, and four by each Field Company of Engineers. To obtain the best results the height of lift or suction should be reduced to a minimum, and can rarely exceed 20 feet. The end of the suction pipe must never be allowed to rest on the silt or mud at the bottom of a well or stream.

62.—Arrangements for watering Animals.

1. All the horses in a camp should be watered in an hour. The sites should be arranged so that the animals may move to and from them without confusion or crowding, arriving from one direction and leaving in another.

2. Mules, being particularly fastidious about drinking water, should if possible, be allotted a separate drinking place. Stagnant water, as in a pond, is apt to be contaminated by large numbers of animals going in to drink; and even in running water, when many animals are drinking, those down stream get foul water. If possible, therefore, the water should be run into drinking troughs made of canvas or boards, but trenches lined with puddled clay will also answer the purpose.

The overflow from the troughs must be carried off with the surface drainage,

and the ground on both sides of the troughs should, if possible, be metalled or covered with brushwood and drained for a width of 10 feet.

3. When troughs cannot be made, the banks should be cut down, and a hard surface formed on the ramp to prevent it being cut up by the animals, and a barrier may be put up to prevent them from going too far into the water. The water must not be less than 5 or 6 inches deep.

63.—Methods of Purifying Water.

1. The best method of purifying water is by boiling, which gets rid of temporary hardness, renders dissolved organic matter harmless, and when properly carried out, practically destroys all micro-organisms. The water should be kept at the boil for at least five minutes. Boiled water should be aerated before drinking. This can be done by passing it through a sieve. Empty biscuit tins pierced with small holes suspended over a storage tank do very well for this purpose, but care is necessary to prevent the addition of fresh impurities during aeration and distribution.

2. As it is not always possible to provide means of boiling water on a large scale, resort must be had to filtration. Formerly mechanical filtration only was attempted and a clear sparkling water was considered good. Efforts are now directed to removing chemical as well as other impurities.

3. The Slack and Brownlow is the pattern of filter in general use. It consists of three main parts, viz., the sterilizing filter, the clarifying filter, and the pump. (**See also** App. A, Military Engineering, Pt. V.)

Treated with care these filters work satisfactorily, and will deliver up to 34 pints in 10 minutes, so long as the filter is clean. They are carried in the field by field ambulances at the rate of 2 per cavalry ambulance and 6 per field ambulance. These filters form the filtering medium of the army pattern filter water cart.

The service water cart (M. IIA or IIB) contains 114 gallons. They can be filled by their own pumps in 20 and 12 minutes respectively, and deliver 3 or $4\frac{1}{2}$ gallons of filtered water per minute by means of 12 taps.

4. Dirty water should be strained before filtering. A good method is to tack a sheet on to a wooden frame so as to form a bag or basin in the bottom of which are put a couple of handfuls of wood ashes. The water is then poured on to them and allowed to percolate into a receptacle beneath.

5. Chemicals are sometimes added to precipitate suspended matter, or remove hardness, or to oxidize organic impurities.

Muddy water may be cleared by adding alum. Six grains of crystallized alum per gallon or one teaspoonful to ten gallons is sufficient. It should be added some hours before the water is required.

Water can be softened by the addition of limewater for drinking, and carbonate of soda for washing purposes. The latter is unsuitable for drinking water, as it gives an unpleasant taste.

Potassium permanganate (Condy's fluid) removes offensive smell from water and to some extent oxidizes dissolved organic matter. It should be added until a faint tint remains permanent. It has not a disagreeable taste.

64.—Shelters.

(See also F. S. Regs., Pt. I, Secs. 55 and 120, and Military Engineering, Pt. V, Sec. 2.)

1. Simple shelters may be formed in many ways. One method is to drive two forked sticks into the ground with a pole resting on them; branches are then laid resting on the pole, thick end uppermost, at an angle of 45° , and the screen made good with smaller branches, ferns, &c. A hurdle may be supported and treated in a similar way.

2. A shelter tent for four men may be formed with two blankets or waterproof sheets laced together at the ridge, the remaining two blankets being available for cover inside.

3. When no other materials than earth and brushwood are available a comfortable bivouac for 12 men can be formed by excavating a circle with a diameter of 18 feet, or thereabouts, and building up the earth to form a wall 2 or 3 feet high. The men lie down, like the spokes of a wheel, with their feet towards the centre. Branches of trees, or brushwood stuck into the wall improve the shelter.

65.—Brushwood Huts.

1. If a camp or bivouac is likely to be occupied for some time, the men ought to be huttet. In the tropics huts should be raised off the ground level.

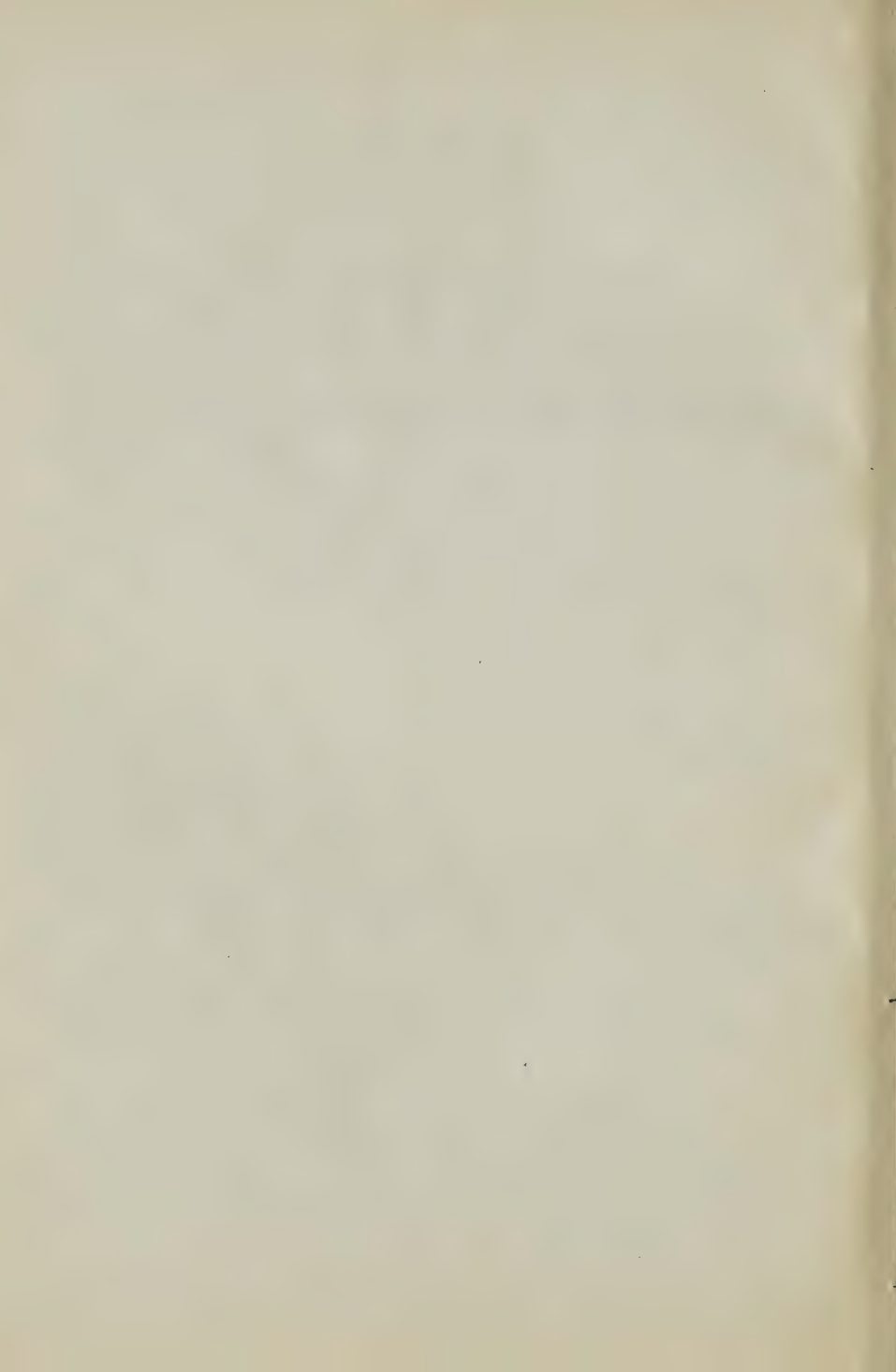
2. The most convenient form of hut is rectangular in plan, with sufficient width for two rows of beds and a passage down the centre, but, where the material available is of small size, one row of beds may be provided, or the hut may be made of circular form. A width of at least 6 feet should be allowed for each row of beds, and the passage should be from 2 feet to 4 feet wide.

The accommodation may be calculated on active service at one man per foot of length when there are two rows of beds, and one man to every 2 feet when there is only one row.

3. When brushwood of 2 or 3 inches diameter and 14 or 15 feet long is available, a hut for a double row of beds may be made as in Pl. 36.

The size of the hut having been settled, a section is laid out on the ground, and from this the length of the rafters is obtained. Each side of the roof is then made separately as follows (Pl. 37):—

Poles of 2 inches diameter are laid on the ground parallel to each other, from 18 inches to 2 feet apart, as **aa** in Fig. 4. These for the rafters. On the rafters, and at right angles to them, light rods or purlins, **bb**, from $\frac{1}{2}$ inch to $\frac{3}{4}$ inch thick are laid, the uppermost one being at such a distance from the end of the poles as will allow the frames lock at the desired height above the ground the lowermost one being within a few inches of the bottom. Between the top and bottom purlin others are placed at a distance apart equal to slightly less than half the length of the thatching material, so that the latter may be supported at three points. With good wheaten straw the interval may be



from 12 inches to 1½ feet. At each point of crossing the purlins and rafters are secured by a short length of spun yarn, and the frame thus made is afterwards stiffened by diagonals lashed underneath the rafters.

The roofing material, which may be unbroken straw, rushes, long ferns &c., is now put on. Commencing at the bottom, a layer 4 or 5 inches thick is laid evenly over the three lower purlins, ears or tops downwards, and secured by a light rod or **thatching piece** tied with spun yarn at intervals of 2 or 3 feet to the second purlin from the bottom. A second layer is now put on one purlin higher up, and is secured in a similar way to the third purlin from the bottom, and so on until the top is reached; the last layer should project over the top purlin, so that when the frames are locked the ends may be twisted together to keep out the wet. When both frames are ready they are raised and locked, as in Fig. 3. Forked uprights and a ridge piece may be added to stiffen the roof.

Each side of the roof may be made in one or more sections as convenient. The ends of the purlins should project about 2 feet beyond the outside rafters, and are supported by the framework forming the gable ends, Fig. 5. The latter are made and thatched in a similar way to the roof, and simultaneously with it. Openings should be left for a door, and close under the ridge at the gable ends for ventilation.

4. Huts may also be thatched by forming the straw or grass into **panels**. The straw in moderately thick layers is doubled and nipped near the centre between two rods, which are tied together tightly at the ends and at intervals of about 6 inches.

The panels thus formed are tied on to the roof, being placed so as to overlap like large slates.

5. In order to give additional head room, the passage may be sunk as in Pl. 37, Fig. 3, with steps at each end, the earth being used to raise the roof. In very cold weather the whole interior of the hut may be excavated, fireplaces constructed as in Pl. 36, Fig. 2, and, if the rafters be strong, some of the excavated earth may be thrown on to the roof, a series of collar ties being added to strengthen it.

6. Walls may be constructed of **wattle and daub**, i.e., continuous hurdle work daubed, over on one or both sides with clay, in which is a portion of any fibrous substance, such as straw, grass, horse hair, &c., chopped into short lengths to prevent the clay cracking and opening as it dries. This mixture, which should be kneaded into the consistency of a stiff paste, should be worked in with the hands. The sides should be strutted at intervals to resist winds, and the roof may be carried on a ridge pole, which may be strengthened by uprights in the centre. (Pl. 36, Figs. 3 and 4.)

66.—Log Huts.

1. When straight timber is abundant, log huts may be constructed, The walls are formed of logs laid horizontally. They are notched into each other at the corners, each notch extending half way through the log, so as to leave

every layer flush. No fastenings are required beyond some **trenails** (wooden pegs) to secure the rafters to the top logs. The roof may be made as already described, or the covering material may be of slabs of wood, or bark of such trees as birch, &c.

2. Bark may be got off trees in large strips by cutting round the trees with a knife at intervals of about 4 feet. The width of bark required is then cut and beaten with a flat piece of wood to detach it from the tree.

67.—Latrines.

(See also F. S. Regs., Pt. I, Secs. 56 and 60.)

1. Latrines should be dug as soon as possible after the troops reach their camp or bivouac. Latrine trenches should be arranged in one line as shown on Pl. 38, with $2\frac{1}{2}$ ft. clear space between each trench. The size of each trench should be 3 ft. long, 1 ft. broad, and 1 foot deep.

After use on the second day these trenches are filled in, and fresh ones dug in the intervals. On the third day, a fresh row similar to the first is commenced 1 foot to the front and parallel to it.

If the ground available is limited in extent, the trenches may be increased to 2 ft. in depth, and made to last over the second day.

2. In excavating the trenches, the turf covering each should be removed and placed about 3 ft. behind each trench, the sides should be kept vertical, and the excavated earth should be well broken up and piled up close to the trench.

3. As a rule 5 trenches should be provided for 100 men for 1 day, 15 trenches (i.e., 3%) will suffice for a strength of 500 men.

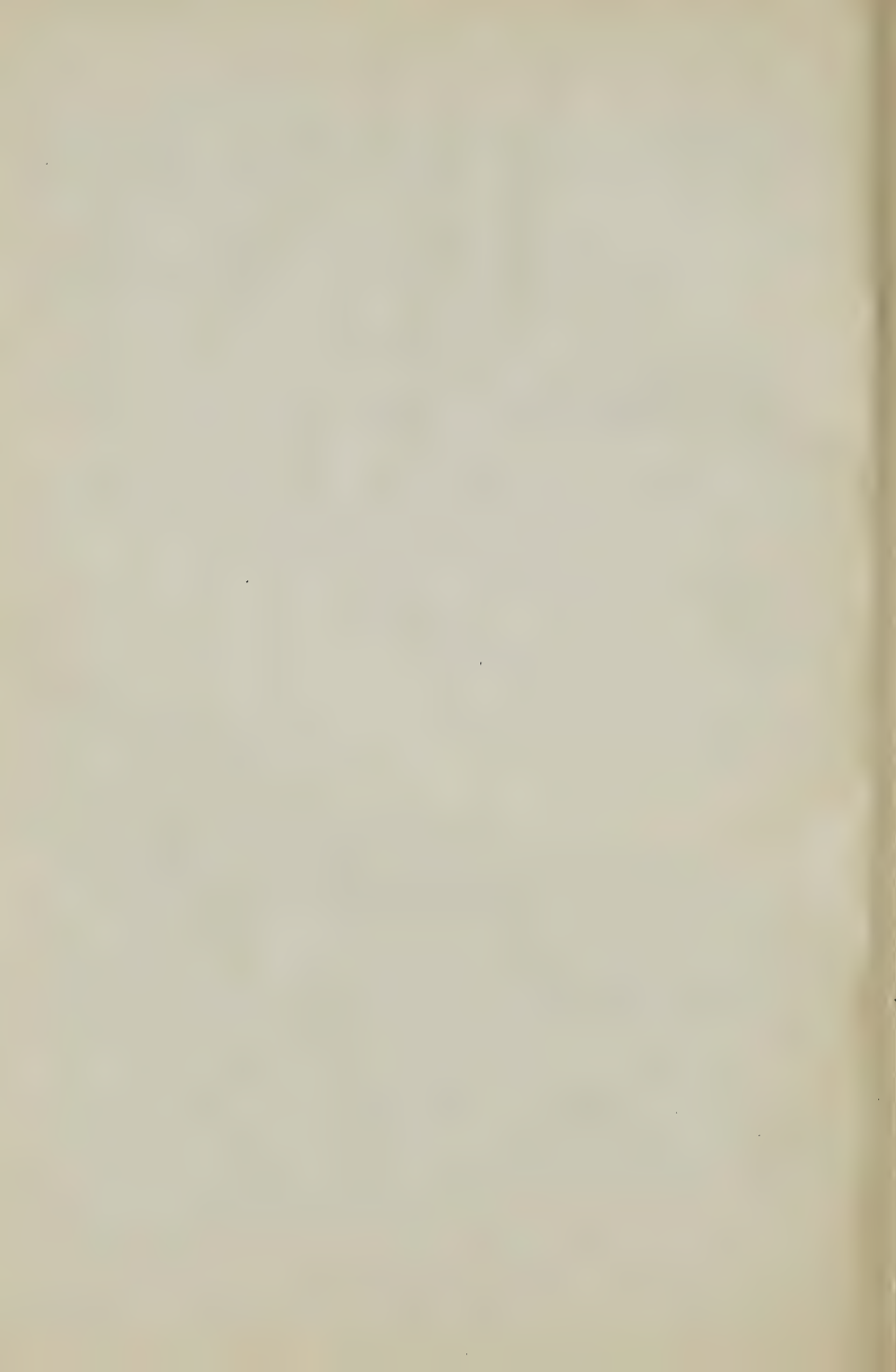
If material is available, the trenches should be surrounded by a screen with overlapping entrance formed in the centre of one of the sides. The length of screen necessary to surround latrines for 1,000 men, calculated on a 5% basis, is about 130 yards.

4. When for exceptional reasons, deep trenches are necessary, they should be provided with pole seats, which should be cleaned daily, preferably with cresol solution. These latrines should be constructed to seat 5% of the troops, 1 yard per man being allowed. (Pl. 20, Fig. 3.)

5. It is very important that a couple of inches of the driest earth obtainable should be thrown each day into latrine trenches in use. If means are available, the earth may be artificially dried for this purpose. If carefully carried out, this will obviate all smell, and will tend to prevent flies collecting. The use of kerosene oil or lime, in and around the trenches, will still further assist in keeping flies away.

Small shovels or improvised scoops should be provided, when possible in the proportion of one for every two short trenches.

6. On vacating a camp or bivouac, the position of latrines should be marked with the letter **L** formed with stones, &c.



68.—Refuse Destructors.

All camp refuse should be collected and burned. Tins should afterwards be buried. Pl. 38, Fig. 2, shows a type of refuse destructor.

With this type and a 40 gallon tank provided with a tap, water can be boiled for drinking purposes and earth dried alongside for use in the latrines. When continual use is to be made of refuse destructors they should be lined with clay and placed under cover from rain.

V.—MISCELLANEOUS**4. TRAINING AND RECONNAISSANCE AND INSTRUCTION OF SCOUTS.**

Chap. 8.—Training in Field Operations (I. T.) Section 110.

5.—And for N. C. O's., "Manual of Map Reading and Field Sketching."

TRENCH WARFARE

NOTES ON ATTACK AND DEFENCE.

From reports received from the front February 1915.

I.—AN EXAMPLE OF INSTRUCTIONS ISSUED REGARDING LOCAL ATTACKS WHEN THE OPPOSING FORCES ARE AT CLOSE QUARTERS.

The general considerations which should guide a commander in organizing and preparing a local attack against a strongly entrenched enemy have been pointed out in previous memoranda. The present instructions aim at laying down in detail the steps to be taken in the carrying out of such an attack, with special reference to the infantry.

It appears, from reports recently received, that many of the assaults made by the infantry on the enemy's trenches are launched and developed on lines similar to those of an ordinary attack. A few scouts advance first and reach the line of the enemy's wire entanglements, where they are very soon put out of action in full view of the leading detachments waiting in the trenches. This does not tend to heighten the moral of these detachments. They leave their trenches with reluctance, move forward slowly, and often return more quickly. Sometimes they suffer considerable loss in passing through their own barbed wire, through which perhaps only one passage has been made. The attack fails and is not renewed.

This is not the way to prepare and to carry out at close quarters an operation which is rather in the nature of an assault than of an ordinary attack.

It is essential that the most minute details should be thought out and prepared, in order that the detachments detailed for the assault may all leave their trenches at the same moment and reach the objective at one rush without firing a shot.

The steps to be taken are as follows:—

- (1.) A definitely limited objective must be selected.
- (2.) The objective and the enemy's means of defence, including the flank defence of the trenches forming the objective, must be thoroughly reconnoitred (aeroplanes).
- (3.) Troops for the assault, and other troops for covering the flanks of the assault by fire, must be detailed.

- (4.) The assaulting troops must be assembled opposite their objective in several columns, each column including a detachment of engineers provided with explosives for destroying the defences.
- (5.) Supports for each assaulting column, and reserves, must be detailed and organized.
- (6.) A different route must be allotted for each column.
- (7.) Means whereby trenches can be crossed (ladders or gangways) must be provided so that all the columns may debouch rapidly and simultaneously.
- (8.) The barbed wire entanglements must be arranged so that there may be as many passages through it as there are assaulting columns.

At a given signal the artillery must lengthen its range, so as to build up a wall of fire behind the enemy's first line, while batteries posted on the flanks continue to bombard the objective with high explosive shell.

On this signal being given the assault must be launched in one rush; this is essential if it is to succeed.

The energy and courage of the troops will do the rest.

Lastly the attention of officers commanding is drawn to the absolute necessity for entrusting the carrying out of the attack to reserve troops coming from behind the line of trenches. There is no doubt that troops occupying the first line trenches have an instinctive reluctance to quitting their accustomed cover. These troops should be used to afford flanking protection to the attacking troops, to support them by covering fire, and to constitute a body upon which they can fall back if eventually it should be found necessary to do so.

III.—MEMORANDUM ON METHODS OF ATTACK WHICH HAVE PROVED SATISFACTORY

Essential factors.—The essential factors may shortly be tabulated as follows:—

- (a.) The objective must be chosen with a view to artillery co-operation in the preparation of the attack, and to the concentration of artillery fire thereupon.
- (b.) The fullest possible information with regard to that part of the enemy's position which it is decided to attack must be obtained by means of reconnaissance.
- (c.) Arrangements must be made for a suitable distribution of artillery fire over the various defences, batteries, trenches, &c., of the enemy.

- (d.) Arrangements must be made for protecting the infantry by artillery fire against counter-attack after the position has been taken, and until such time as the ground gained has been made good.
- (e) The artillery should range repeatedly on the several targets allotted to it, until by careful observation of the results it is clearly established that the required effect can be produced.
- (f.) The action of the artillery and infantry must be simultaneous and combined.
- (g.) In order to make good the ground gained, the fullest co-operation between engineers and infantry is necessary.

1. **Preliminary.**—The present phase of the operations approximate to siege warfare; and methods of attack which are not based on realization of this fact have proved not only costly but unsuccessful.

2. **Objective.**—The extent of the actual objective of each attack must be limited by the necessity for ensuring a sufficient concentration of artillery fire upon it. Such an objective may be a line of trenches not more than 500 yards in extent. But other portions of the enemy's line should be attacked and bombarded at the same time, in order to keep the defenders occupied and to distract their attention from the true objective.

3. **Front.**—The front should be divided into two sections, an offensive section and a defensive section. The latter should be lightly held, and the operations undertaken in this part of the line (local attacks, saps, bombardments), should be calculated to draw the enemy's attention from the remainder of the front. The section of the front on which the attack is to be driven home should be selected with a view to securing the most favourable conditions for the co-operation of the artillery, and its extent must depend upon the amount of artillery which can be concentrated in that part of the line.

4. **Reconnaissance.**—Reconnaissances should be carried out by day and by night in order to obtain as detailed information as possible with regard to the enemy's defences, wire entanglements, firing and communication trenches, natural obstacles, the lie of the land, distances, enemy's batteries, &c. All information so gained must be marked on a map for the use of the C. R. A. in the preparation of his arrangements, and these form the basis of the plan of attack.

5. **Infantry attack.**—(a.) The troops in the trenches should not take part in the assault.

(b.) The assaulting columns should be massed, under cover, near or in the communication trenches.

(c.) The strength of the force detailed for the assault must be determined by the importance of the objective. As a general rule, on fronts of 500 to 800 yards, five battalions and two engineer companies have been found sufficient to carry out the assault and to provide sufficient reinforcements and reserves.

6. **Co-operation between artillery and infantry.**—The essential factor is co-operation between the action of the artillery and the infantry attack. With this end in view repeated rehearsals should take place, and all observing stations should contain an infantry as well as an artillery officer, both being separately connected with their report centres by telephone.

7. **The assault.**—When the C.R.A. reports that all is prepared, final orders should be sent to the infantry to move up to their positions of readiness. The destruction of the enemy's defences should be completed by the concentration of fire on a small area, and the assault should then be launched. As soon as the infantry approaches the enemy's trenches, the artillery must increase its range so as to establish the wall of fire, previously alluded to, behind the enemy's position,

During the whole time that the attack is in progress the troops in the trenches on either flank of the assaulting parties must maintain an incessant fire with rifles and machine guns on the enemy's trenches to the right and left of the position attacked.

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